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THE
COMMAND AND GENERAL STAFF SCHOOL
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REVIEW OF MILITARY LITERATURE

MAJOR FRED DURING, *Editor*
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FOREWORD

The object of this publication is a systematic review of current military literature, through cataloging articles of professional value, in selected military and naval periodicals, in the domestic and foreign field.

Articles from foreign periodicals are treated by translations of titles and digests of contents; material of particular importance is covered more extensively in a Section of "Abstracts of Foreign-language Articles."

A "Library Bulletin" Section lists books, recently accessioned, which are of particular significance.

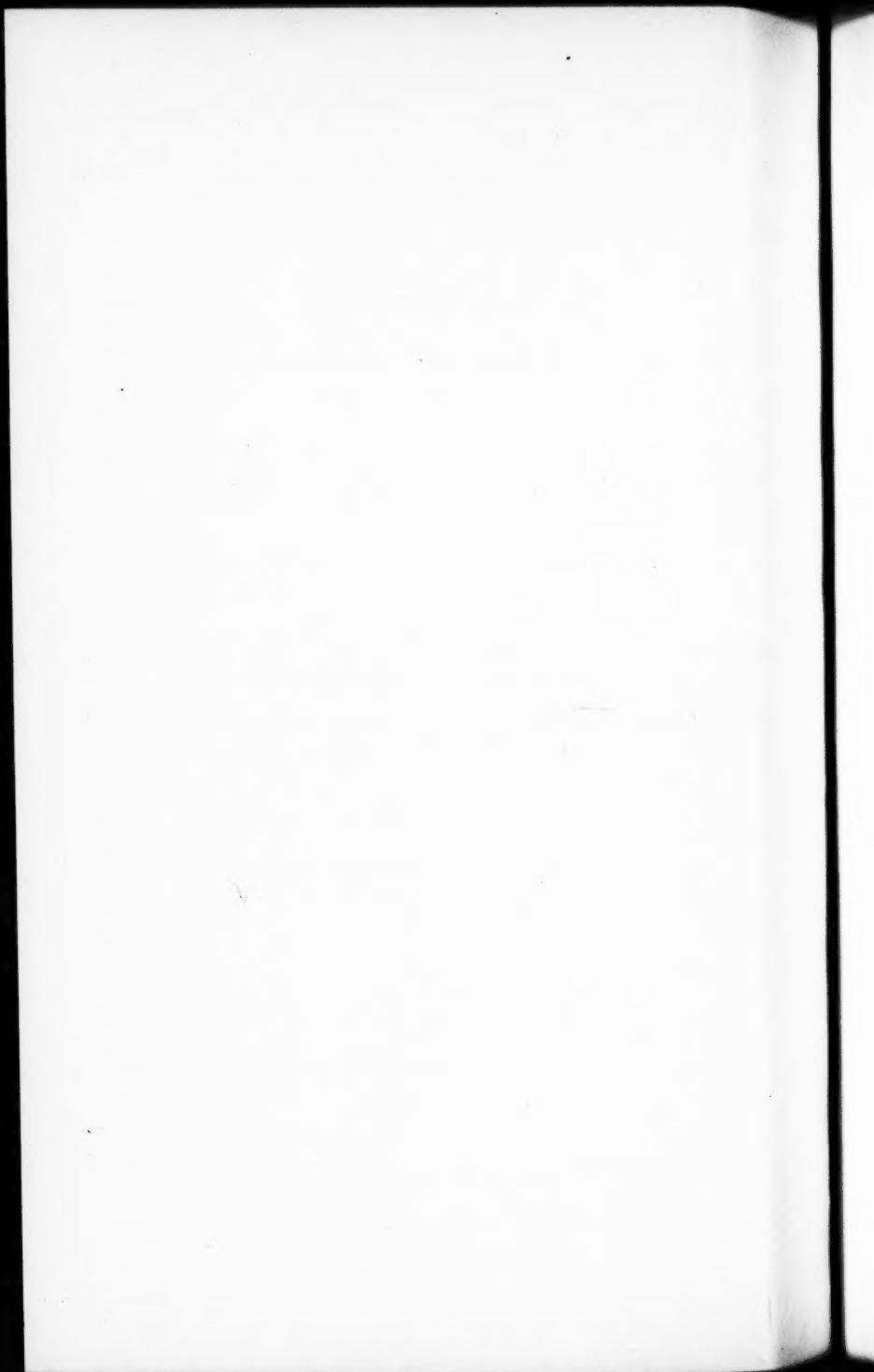
This Quarterly is published as a guide to modern military tendencies and to inspire vigorous thought on the subjects treated.

The opinions expressed by authors are not necessarily official.

December, 1936

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Review of Military Literature

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June 1936); *Pioniere* (May 1936); *Revue Militaire Suisse* (April, May 1936);
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d'Infanterie* (April, May, June 1936).

Maj. L.K. Truscott, Jr.: *Revue de Cavalerie* (March-April 1936).

Section 1
ORIGINAL MILITARY STUDY

**ORGANIZATION AND EQUIPMENT OF ENGINEER UNITS
DESIGNATED TO BE ATTACHED TO OR TO COOP-
ERATE WITH MECHANIZED CAVALRY**

By Captain Don G. Shingler, Corps of Engineers

INTRODUCTION

The purpose of this study is to determine the essential elements of organization and equipment of engineer units designated to be attached to or to cooperate with mechanized cavalry.

"The mission of the engineers in war is to assist the operations of the field forces by means of engineering works." Since the engineer role is one of assistance, it is imperative that the problems of the force as a whole be understood before attempting to consider a particular element of that force. For this reason, Section I has been inserted to summarize the characteristics and tactical employment of mechanized cavalry units with special emphasis on the elements which may affect the engineers. Section II* develops the type of assistance which can or should be provided, while subsequent sections deal with the "how" of the problem.

*This section is considered necessary as a logical approach to the assigned subject of organization and equipment. It follows the directive of the Chief of Staff:

"Too often in the past organization has been attempted from the standpoint of equipment rather than from the standpoint of missions assigned." (Extract from mimeograph: *General Principles to Govern in Extending Mechanization and Motorization Throughout the Army*, Chief of Staff, dated 1 May 1931.)

SECTION I

MECHANIZED CAVALRY

COMPOSITION.—During the development stage, mechanization has assumed a variety of forms in this country as well as abroad. The assigned subject of this paper limits the general subject to mechanized cavalry. In order to have a more or less concrete unit to consider, it will be assumed that mechanized cavalry units will have the general composition indicated by the *Tables of Organization and Reference Data* used for instructional purposes at the Command and General Staff School during the school year 1935-1936.

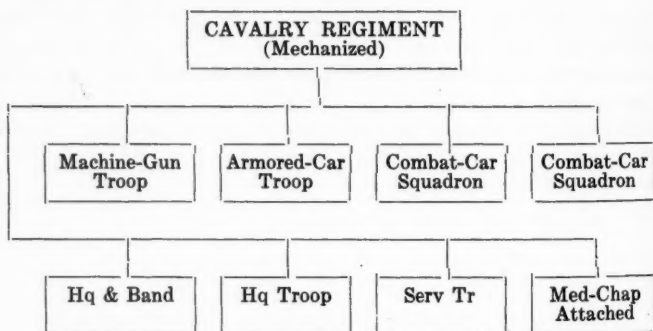
The basic elements of the mechanized cavalry regiment consist of:

(1) Combat-car units utilizing armored vehicles of the fast tank type, combining road speed, great cross-country mobility with shock and fire-power.

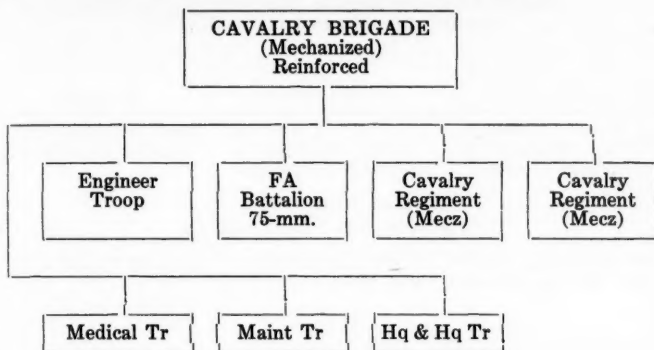
(2) Armored-car units containing wheeled vehicles possessing great speed and fire-power, particularly suited for distant reconnaissance missions.

(3) Machine-gun units of great fire-power, transported in carriers combining cross-country mobility and limited protection for personnel and weapons.

The Cavalry Regiment (mechanized) contains the essential elements shown in the following diagram:



The Cavalry Brigade (Mechanized), (Reinforced), contains the components indicated in the following diagram:



TACTICAL EMPLOYMENT.—The proposed tactical employment of mechanized cavalry has a decided bearing upon the mission, organization, and equipment of accompanying engineers. Some well-defined premise, therefore, must be established, embracing the generally accepted tactical principles governing the use of this mechanized arm.

The most recent and concise treatise on this subject appears in the Command and General Staff School publication, *Tactical Employment of Cavalry* (Tentative) (1935), Part B, Cavalry (Mechanized).

In avoidance of excessive detail, a brief summary of the salient points appearing in the above-mentioned text is presented herewith in tabular form. The left column displays principles applicable to mechanized cavalry operations; the right column contains brief remarks to indicate possible engineer considerations which form the basis for subsequent discussion.

Marches

Mechanized Cavalry

Individual vehicles and platoons may march as fast as 35 miles per hour.
Day's march—150 miles for logistical computation.
Units larger than regiment usually march in two or more columns, each a tactical unit.
Typical march formation—see Plate I, following:

Engineers

High degree of mobility required.
Limited time for work.
Speed; supply.
Engineer unit(s) must be divisible.
Note contemplated use of engineers.

PLATE I
TYPICAL MARCH FORMATION
 Reinforced Cavalry Brigade (Mechanized), Operating
 Independently. Brigade in Two Columns

<i>Left Column</i>	<i>Right Column</i>	<i>Remarks</i>
All or part of armored-car Tp. Engineer reconnaissance personnel.	All or part of armored-car Tp. Engineer reconnaissance personnel.	Reconnaissance detachment or detachments.

Distance: 0 to 2 hours or more.

CC Tr (less one plat) with MG plat attached	CC Tr (less one plat) with MG plat attached	Advance Guard Engineer platoons may be attached or placed at head of main body.
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Distance: 5 to 15 minutes.

Brigade and regimental commanders' groups usually march in this interval.

Fwd Ech RHQ MG Tr (less 1 plat) Mortar Plat All or part of FA Bn CC Sqs (less det) Armd C Tr (less dets)	Fwd Ech RHQ MG Tr (less 1 plat) Mortar Plat All or part of FA Bn CC Sqs (less det) Armd C Tr (less dets)	FA Bn CO's party in one column. When Bn is split, necessary parties go with each Fwd Ech.
Engr Tr (less dets)	Fwd Ech Brig Hq	Either column
Hq Tr: R Ech Med Det Maint Plat, Serv Tr	Hq Tp: R Ech Med Det Maint Plat, Serv Tp	

Distance: 0 to 75 miles.

Med Tr Trains [Serv Trs (less Maint Plats)] Maint Tr	Med Tr Trains [Serv Trs (less Maint Plats)] Maint Tr	Follow either or both columns.
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Mechanized Cavalry

Road reconnaissance should precede each march.

Security by advance, flank, or rear guards; attach engineer section or platoon if available.

Engineers

Engineer reconnaissance (?)
 Provision for engineer contingents with security elements.

Bivouacs

When operating independently bivouacs to be suitable for all-around defense.

Defensive works. Camouflage. Reconnaissance.

Reconnaissance

By bounds within specified limits or zones.

Night operations restricted.

Air cooperation desirable.

Reconnoitering detachments precede main body:
reinforced squadron or troop with Armored-
Car Troop attached for patrols.

Armored-Car Troop—zone 25 miles wide using
3 platoons for patrols.

Radio for communication. Vehicles also used.

Engineer reconnaissance
if available with each
detachment and per-
haps with each patrol.
Broad front for engineer
reconnaissance.
Engineer radio (?) Mes-
senger service.

Counterreconnaissance

Less adapted for this role.

Valuable to counter hostile mechanized forces.

Defensive works. Ob-
stacles.

Attack

Selection of terrain important; use of obstacles
for own advantage.

Terrain reconnaissance important for all agencies.

Combined action habitual: dismounted fire-
support of weapons; mounted attack by
combat-car elements.

Main attack usually an envelopment.

Reconnaissance. Good
maps. Obstacles.

Reconnaissance.

Overcome obstacles. As-
sist in organization of
captured terrain.

Defense

Active defense most favorable form.

Passive defense emphasizes obstacles and fields
of fire.

Communications. Even-
tual reserve.

Prepare obstacles. Fields
of fire.

Delaying Action

Block advance (defensive); offensive action
against hostile flanks.

Terrain important.

Defensive works. Com-
munications. Recon-
naissance.

Reconnaissance.

Raids

Suitable mission where terrain favors action.

Object: reconnaissance or destruction.

Route and terrain recon-
naissance.

Reconnaissance. Demo-
lition.

Defense Against Mechanization

Natural or artificial obstacles prevent or limit
operations.

Defended obstacles most effective.

Obstacles overcome by: removal, detouring, or
bridging (crossing).

Information needed. Co-
ordinate technical and
tactical.

Defense by cavalry or
engineer personnel?

Value of obstacle de-
pends upon ultimate
delay it causes.

Defense Dispositions

Units of all arms and services equipped and trained to defend themselves.	Weapons. Armor. Training.
Trains require antitank guns.	Armament of service vehicles.
At a halt, security forces establish road blocks.	Location, construction; Supply of materials.
Active reconnaissance by air and mechanized agencies a prerequisite.	Reconnaissance. Liaison with air service.

SECTION II

ENGINEER FUNCTIONS

GENERAL CONSIDERATIONS.—“Engineer troops are essentially organizations of skilled labor designed to increase the combat capacity of other arms through the execution of works facilitating their movement, increasing their defensive powers, and providing for their shelter and water supply.”

The *Engineer Field Manual* (Volume I) summarizes the functions of engineers in the theater of operations thus:

“(1) All work of construction and the repair and maintenance of all structures of every character, except such as are specifically assigned to other services.

“(2) Military mining, demolitions, and protective measures against enemy mines.

“(3) The operation of railways, portable and fixed electric light and power systems, water supply systems, and all other utilities of general service, except such as are specifically assigned to other services.

“(4) The execution of surveying and mapping, including the production and distribution of maps.

“(5) The procurement, storage, and issue of all materials for construction work, for the organization of defensive systems, and for all other operations assigned to the engineer arm, including all plant, tools, and appliances for such work.

b. The most important function of the engineer arm is the maintenance, improvement, and construction of routes of communication and movement. This is a continuous operation and employs the major portion of the engineer personnel.”

To the above list may be added two other functions which an engineer contingent must consider: camouflage and combat.

The organization, equipment, and technique of engineer components, designed to perform the functions listed, and generally applicable to non-mechanized operations, is fully described in current official publications. The general subject requires no further elaboration in connection with the present study.

CONSTRUCTION.—Since mobility is the essential characteristic of mechanized cavalry, it is safe to assume that during active operations the construction and repair of permanent or semi-permanent installations will rarely be necessary. In situations where time permits such work, time and circumstances should also permit the assignment of appropriate engineer units from higher echelons for the accomplishment of the tasks. As in the case of the combat regiment and the engineer squadron, construction work appropriate for mechanized engineers will be limited to minor tasks requiring a short time and but few pioneer tools.

DEMOLITION AND OBSTACLES.—“Since all mechanized forces are sensitive to terrain, and because of their limited defensive power, the creation of obstacles to impede the enemy’s forces, and the removal of obstacles to assist our own, become major problems.” The importance of this class of engineer work has been repeatedly stressed by military writers since the problems of mechanization came up for close study. The use of obstacles is not limited to purely defensive operations. As shown in the paragraph on “Tactical Employment,” obstacles are an important consideration in most phases of mechanized cavalry operations. The general subject of demolitions is closely allied with that of obstacles, and no purpose is apparent in undertaking an academic distinction. However, extensive demolition projects may become necessary or desirable in connection with raids against sensitive points in hostile rear or flank areas.

A great variety of installations have been proposed to limit or delay the advance of mechanized vehicles. A complete description of these involve questions of technique beyond the scope of this paper. The *Engineer Field Manual*, Volume II, Part Two, describes certain standardized forms of obstacles and demolition measures. In general, these fall into three classes: first, those providing craters, ditches, or tank traps

to interrupt avenues of approach; second, obstacles created from felled trees, barbed wire, cables, posts, or combinations thereof; and third, antitank mines. To the commander of an engineer unit, the above installations indicate the need for the following materials and equipment:

(1) Relatively large quantities of explosives with necessary demolition equipment.

(2) Power equipment capable of making rapid excavations; air drills; cranes, etc.

(3) Antitank mines of a design convenient for transporting as well as laying.

(4) A supply of barbed wire, steel cables, and accessories.

(5) Chemical mines (if authorized).

(6) Sufficient demolition personnel.

(7) Suitable transportation for personnel and materials.

Counter measures against hostile installations involve tasks extremely variable in nature and difficult to anticipate. Road craters, road blocks, mines, and demolitions may block routes of communication. Extensive belts of antitank mines, gassed areas, and traps may limit or prevent the operation of mechanized vehicles within or across a zone. In such cases the engineers should be able to obtain timely information of the extent and nature of enemy works, then furnish a quick and accurate estimate of the time required to remove or detour such obstructions, in order that the cavalry commander may be able to make a prompt decision as to future action. Technical and tactical aspects may thus be inter-dependent, and increasingly so if the obstructions be covered by hostile fire.

The essential engineer requirements to counter hostile works can be summarized thus:

(1) Timely information (reconnaissance).

(2) Qualified personnel.

(3) Rapid means of communication between engineers, reconnaissance personnel, and tactical commanders.

(4) Equipment and personnel capable of prompt and rapid action at the desired points.

UTILITIES.—Railway operations will doubtless be important in the supply of mechanized cavalry units. However, unless the engineer units assigned to such a force be made disproportionately large, the maintenance and operation of rail facilities will have to fall on the engineers of higher echelons.

Electric light and water supply systems operated by organic engineer personnel are provided in units down to the division. With the mechanized cavalry units, it seems reasonable to relieve the engineers from the responsibility of illuminating the unit headquarters. The electrical system of modern vehicles provides a source of power which can be made available for essential command and administrative agencies which require illumination in or adjacent to their respective vehicles. Supervision over the operation of existing commercial facilities may still come under the technical control of the unit engineer without materially affecting the organization or equipment of the engineer unit.

Water supply for mechanized cavalry is a pertinent engineer function, but promises to be less difficult than for infantry or horse-cavalry units. Mobile missions will afford opportunities to refill vehicle and individual water containers from existing facilities. The quantity of water required will be relatively small due to the absence of animals and the negligible amount required for such vehicles as have water-cooled motors. Mechanized cavalry units possess a variety of fast-moving vehicles capable of transporting small containers of water sufficient for drinking purposes and mess requirements, in case water supply points are scarce.

Considering the above points, and in order to have a basis for the study of engineer organization and equipment, the following assumptions will be made:

- (1) No special electric lighting equipment will be required.
- (2) A small, portable, gasoline-driven water pump will be carried for the dual purpose of providing a water supply point if required, and for such engineer work as may demand such equipment.
- (3) The engineers can improvise and mark suitable water supply points near bivouacs, making full use of local sources.
- (4) The unit engineer will have personnel qualified to supervise the operation of existing commercial facilities in small towns and villages in case military control is necessary.

RECONNAISSANCE.—The great importance of reconnaissance in general and engineer reconnaissance in particular is most obvious in the remarks noted in the paragraph on "Tactical Employment," paragraph 4. In principle, it differs little from the essentials applicable to a less mobile force. The subject is covered in detail in current publications. However,

the need for speed increases, both in collecting the information, and in passing it on to the agencies immediately concerned. Moreover, the area to be reconnoitered may be both broad and deep. As was previously stated, engineer reconnaissance may have a decided effect on tactical plans and hence should be carefully correlated with tactical reconnaissance. Air reconnaissance should prove of great value, especially if it works in close cooperation with ground agencies.

What specific information must engineer reconnaissance secure, which cannot be obtained by mechanized cavalry agencies specially trained and equipped for reconnaissance missions? In addition to purely tactical information, cavalry personnel can be expected to check the routes followed, noting obvious defects in existing route maps; note the location and general nature of natural or artificial obstacles encountered; determine points favorable for the creation of obstacles; make a reasonable estimate of the suitability of routes or areas for the operation of mechanized forces; explore detours and alternate routes; and, as a result of training and practical experience, estimate the capability of bridges and culverts to withstand cavalry loads. In general, then, cavalry personnel can readily determine favorable as contrasted with unfavorable elements. Cavalry personnel, unless specially trained and equipped, cannot be expected to locate and estimate local supplies of construction plant, materials, or explosives; minor repairs required on roads and bridges; the time, labor, and equipment needed to remove obstacles, repair existing roads, bridges, or culverts, or to construct new crossings. In other words, the cavalry units may be expected to rely on engineer personnel to determine the practical feasibility, in time, men, and material, of remedial action, when adverse conditions are encountered.

The above considerations are applicable, in general, to distant or route reconnaissance, the close-in reconnaissance of advance, rear, or flank guards, as well as special missions incident to a contemplated tactical maneuver. It is pertinent to note at this point that cavalry vehicles are provided with a full complement of men; each individual has a specific and important task assigned. There is no space within cavalry reconnaissance vehicles for engineer personnel.

A better understanding of this vital reconnaissance problem can be obtained by a more detailed study of an example. Consider the action of the most advanced element of the left

column of the brigade march formation shown in Plate I. Assume that an armored-car troop, with an appropriate engineer detachment, is designated as Reconnaissance Detachment No. 2, and ordered to precede the advance guard, initially, by two hours. Adequate instructions have been issued as to the tactical situation, zone of action, rate of advance or phase lines, mission, and means for lateral coordination. The troop commander may elect to send out three patrols of one platoon each, distributed in width to cover the assigned zone, while he follows his line of patrols with the fourth platoon reserve.

So long as the patrols encounter no unfavorable conditions, little need exists for engineer assistance. When a questionable situation arises, the information will be made known to the troop commander by radio or messenger. At this time an engineer detail should be available to make a technical report without delay. The results of this report may be of immediate concern to the troop commander, his column commander, the brigade commander, or unit engineer. For the moment, one engineer vehicle dispatched to the reported locality will suffice for the required inspection and report. Other missions can be accomplished in succession. When a broad zone of demolition appears to cover the entire front, a report of its character and extent can be quickly made. The condition of the principle routes can be determined as first priority and technical recommendations submitted without delay. Further and more detailed reconnaissance must be made by cavalry and engineer elements which follow.

Granted that more than one engineer vehicle would be desirable with each armored-car troop, there is a practical limit to the number of non-organic vehicles which can operate with the cavalry troop without adversely affecting its tactical employment. If one engineer vehicle were provided for each armored-car platoon, there would have to be an engineer vehicle for each four cavalry cars. Under the circumstances, it would seem that a single engineer vehicle can accomplish the essential engineer duties required in connection with more or less rapid reconnaissance which would be expected of an armored-car troop under normal conditions.

Behind the cavalry reconnaissance elements just mentioned, the advance guard(s) follow(s) with reconnaissance as a partial mission. If an engineer platoon be attached as suggested in Plate I, there will be need of reconnaissance not unlike that performed by the more advanced elements, but

probably more restricted in latitude, but more detailed in character. The engineer platoon must be equipped to provide its own reconnaissance vehicles, at least one of which should be capable of defending itself against ambush by hostile elements.

The use of armored cars for certain types of engineer reconnaissance seems necessary. If a cavalry regiment requires an armored-car unit for reconnaissance purposes, rather than motorcycles or trucks, there must be distinct need for the more elaborate vehicles. If the proposed use of cavalry reconnaissance elements is such as to require the protection, fire-power, and mobility of armored cars, then any vehicle intended to accompany and cooperate with the cavalry armored cars must possess similar characteristics or else become a liability. For this reason engineer armored cars have been considered as appropriate for use with cavalry armored-car elements. If and when the cavalry reconnaissance vehicles are radically altered in characteristics the engineer vehicles should be made to conform.

In addition to the special reconnaissance vehicles just considered, there will always be need in an engineer unit for light, unarmored vehicles for use on technical missions close to or behind friendly troops.

MAPS.—Adequate maps should be provided a mechanized force. In this discussion the word map will be assumed to include both the standard sheets prepared in advance of operations, and the sketches, overlays, overprints, and graphical reports prepared during a campaign. The two classes will be considered in turn.

The compilation and reproduction of multi-colored and detailed military maps requires highly trained technicians and special equipment. Such work is obviously beyond the capabilities of a relatively small engineer unit such as might be assigned duties with the mechanized cavalry. It is the function of General Headquarters to make available, at the beginning of an operation, appropriate maps in adequate quantities. Distribution is effected through unit engineers. Commercial road maps are becoming more numerous and complete and possess some military value. U.S. Geological Survey maps were found satisfactory by the mechanized force at Fort Eustis.

Assuming that a reasonable supply of maps are made available to a mechanized force, there remains the important

task of verifying or revising the data shown, and supplementing them with the latest available information of friendly or hostile installations, as well as showing the suitability of terrain for mechanized operations. An engineer unit should be able to collect, interpret, and disseminate such information promptly to the mechanized command either in the form of overprints, overlays, sketches, airplane photographs, or bulletins.

ENGINEER SUPPLY.—A mechanized cavalry unit will look to its engineer contingent for the supply of equipment and materials normally furnished through engineer channels. Since the cavalry unit will attempt to carry a reserve to enable it to operate for a prescribed period without replenishment, provision should be made to maintain essential engineer supply on the same basis. Unfortunately, construction materials are heavy and bulky, so that they cannot be carried in large quantities as a normal load. Reconnaissance is necessary in order to locate available local resources, and the needs for future operations. Requisitions on rear establishments must be submitted early to insure delivery at the time and place required. Bridge timber, explosives and mines, wire, cables, and road block materials may prove more necessary to mechanized units than the familiar sand bags and barbed wire to the infantry elements.

The organic engineer units of the infantry and cavalry divisions transport a supply of engineer entrenching tools for the use of the combat elements. This arrangement lightens the load of the foot and animal elements, and makes available the entire stock of tools to the particular units requiring them in a given situation. In a mechanized cavalry brigade, a different condition prevails. The use of trenches, emplacements, or defensive works will be exceptional and probably limited to the machine-gun units or rear elements. Then, too, the mobility of the combat unit will not be appreciably affected by the bulk or weight of the few tools required by the personnel of each vehicle. Even if the tools were pooled and transported on engineer vehicles the distribution to the several combat elements might prove time-consuming and difficult. For these reasons, it seems logical that cavalry vehicles should be provided with essential engineer tools as standard equipment, available for assisting the vehicles over minor obstacles, improvising road blocks, or providing protective works for personnel or weapons when on the ground. Engineer transportation will thus be relieved of a considerable load.

MAINTENANCE OF ROUTES OF COMMUNICATION.—The maintenance of routes of communication promises to be a most important as well as difficult task. From the engineer standpoint, the difficulty arises from a combination of circumstances: the great weight and number of vehicles involved, the rapid rate of advance, probable enemy counter-measures, the extensive road net, the limited personnel available for maintenance and repair, and the vital importance of time.

Excluding for the moment any consideration of bridges, it is apparent that no attempt can be made by a relatively small engineer component to maintain roads in the sense the term is used in civilian practice or even in the areas of less mobile military forces. The aim will be to get the force forward with the least delay by work of a pioneer rather than an engineering nature. It will involve such tasks as repairing culverts, removing road blocks or mines, marking routes, and strengthening bridges. Time will be conserved by early and thorough reconnaissance, followed by the quick dispatch of personnel and equipment to perform essential work. Machine tools and labor-saving devices will facilitate operations. The marking and clearing of landing fields may require the occasional assignment of engineer personnel.

The repair or construction of bridges presents a serious problem. What an engineer unit can accomplish will prove far short of what the engineer desires and what the cavalry commander may expect. Bridging operations will be limited by time, material, and personnel.

As an approach to the subject consider the question of load capacity. The War Department has fixed 15 tons gross as the maximum allowable weight for a fully loaded vehicle designated to accompany an army for movement by highway, and seven and one-half tons gross as the maximum for vehicles to accompany an infantry or cavalry division in the field. Since a mechanized cavalry unit may be expected to be a General Headquarters unit or Army organization, future development may result in vehicles approaching 15 tons in weight, although existing models of combat vehicles, such as the cavalry modification of the T-2 tank, tend to limit gross weights to seven or eight tons.

Ponton equipment of appropriate load capacity for seven and one-half ton vehicles already exists in the form of Light Ponton Companies assigned to field armies, and adapted for

motor traction. This equipment is considered suitable for use with large mechanized forces only. One company contains 36 pontoons and the necessary equipment to construct 688 feet of a seven and one-half ton bridge. It may be presumed that the necessary amount of this equipage, together with additional personnel for its construction, would be made available to the mechanized cavalry commander when circumstances warranted, and when time and space factors permitted. On the other hand, to include any considerable portion of the equipage as organic equipment of a small mechanized unit, designed for great mobility, seems unjustified.

Studies are being conducted by the Engineer Board of folding pontoons of light construction, as well as various forms of rubber equipage. The development of some form of light, mobile equipment capable of carrying mechanized cavalry loads appears highly desirable and would offer the mechanized engineers a valuable tool when bridging or ferrying operations are anticipated. A small unit of such equipment would furnish a fairly rapid means of bridging relatively narrow streams, and could also be used for ferrying operations on wider bodies of water. However, until an approved design is available for consideration, it appears inadvisable to specify exactly what, if any, ponton equipage is to form part of the organizational equipment of mechanized engineer units.

Fixed bridges must be considered both in the light of what the tactical commander may desire and what the engineer is able to furnish under probable operating conditions. Many views have been expressed concerning the bridging requirements of mechanized units. Certain foreign writers have suggested that engineers furnish bridging tanks perhaps designed to permit the bridge to be launched from within the tank. There appears to be substantial agreement only in the fact that some form of quick and portable bridging expedient is necessary.

Prior to operations in a particular area, a map study or airplane reconnaissance should disclose the existence and general character of major streams or obstacles which may have to be negotiated in carrying out a definite tactical mission. Anticipatory planning will thus enable the engineer to make provision for the forwarding of adequate ponton equipage, portable bridge units, or materials for standard types of bridges, and if necessary, additional engineer work units for construction.

Minor obstacles will be encountered which cannot be anticipated from a general reconnaissance. Such obstacles may take the form of skilfully placed road craters, comparatively narrow draining lines with steep banks, or small streams which cannot be forded due to the condition of the bottom. Mechanized operations will not be restricted to improve roads but will, on occasion, involve cross-country movement—at least by combat elements. Minor obstacles may have to be crossed at points not on the road net. This is the type of bridging operations which the mechanized unit must be prepared to meet. In many cases it is probable that the time element will be of vital importance.

As in the past, the engineer must place his chief reliance on improvised means to overcome minor obstacles. The combat vehicles of the mechanized force have a high degree of cross-country mobility which simplifies the engineer task by permitting the vehicles to negotiate steep slopes (as when a bank is cut down in lieu of bridging), pass over soft ground, and utilize improvised bridges lacking finished approaches. When the construction of a bridge up to about 30 feet in length becomes unavoidable, the time element may preclude the use of improvised means. The *Engineer Field Manual* suggests that about one and one-third Basic Work Units days (of 8 hours each) will be required to construct a timber trestle 30 feet in length, providing the materials are available at the bridge site. One engineer platoon of present strength could not complete this task in an 8-hour working day, while an entire troop would require more than five hours for the construction after assembling all materials.

Although no definite design has been adopted for a portable bridge 30 feet in length and suitable for mechanized cavalry use, considerable thought has been given the subject and several designs proposed which indicate the feasibility of the plan. The characteristics of such a portable bridge cannot be predicted with accuracy, but should be: transportable in two vehicles of high cross-country mobility; capable of being erected with the minimum of personnel, using such tools and equipment as may be available to a mechanized unit; capable of being erected in a minimum of time. A length of approximately 30 feet appears to be a conservative minimum from a tactical viewpoint. One unit of such a bridge should be included in the organizational equipment of a mechanized engineer unit.

Although it is an obvious burden, its availability may at times be vital, and the necessity for its use cannot always be foreseen as in the case of extensive ponton operations.

CAMOUFLAGE.—The engineers normally assume certain responsibilities in connection with camouflage which may be summarized as follows:

(1) Advice and assistance on camouflage matters, including training.

(2) Erection of minor camouflage of common interest to all elements.

(3) Supply of special camouflage materials and tools.

Camouflage principles appear to be especially applicable to the operations of a mechanized unit: (1) as an element of protection from hostile observation and attack in connection with bivouacs, marches, and installations; and (2) to secure surprise. These closely-related topics will be considered briefly.

Since hostile attack in force must, in general, be based upon specific information as to the location of the objective, it seems obvious that any measures which tend to prevent or vitiate hostile reconnaissance becomes valuable protective measures. Effective camouflage of bivouacs appears very important. Mechanized elements in motion are difficult to conceal unless the movement is made at night or under cover of fog or smoke. However, it appears possible to conceal the character of the vehicles by the use of light covers or nets, designed to alter the characteristic outlines of combat vehicles. Such measures should prove especially effective against hostile observation aviation. As a protective measure, it seems desirable to utilize all means available to conceal the location of supply vehicles and establishments, as well as obstacles, and especially prepared crossings.

Effective surprise involves, among other things, movements which are unexpected in force, character, or direction. The elements noted in the above paragraph contribute to this end.

The engineer mission, in connection with camouflage, is closely allied with that of the other arms and services contained in a mechanized organization. *Training Regulations 195-40* (paragraph 11) tabulate and weigh camouflage requirements as follows:

- | | |
|---------------------------------------|-----|
| (1) Proper choice of positions..... | 40% |
| (2) Camouflage discipline..... | 25% |
| (3) Proper erection of materials..... | 20% |
| (4) Camouflage materials used..... | 15% |

The engineers have advisory responsibility in connection with the first three items, and supply functions in connection with the last-named. Camouflage material, in turn, may be considered under two headings: that forming part of the normal equipment furnished to and used by units of other arms, and special supplies required for a particular situation. Apart from periodic replacement, mechanized engineers will have little concern with the former. For the latter, a limited amount may be carried with the organization, depending upon the proximity of rear supply establishments.

Based on the foregoing considerations, the following conclusions are drawn as applicable to engineer camouflage functions with mechanized cavalry:

(1) Each vehicle and unit in the cavalry force should carry, as standard equipment, such camouflage materials and tools as it may require.

(2) The supply of camouflage tools and equipment will be effected through engineer channels as in the case of other engineer supplies.

(3) Each element of the cavalry command will be responsible for the planning and execution of routine camouflage work.

(4) Engineer personnel attached to or cooperating with mechanized cavalry will provide technical supervision of camouflage activities, and assist in the erection of minor camouflage of common interest to all elements.

COMBAT.—Combat missions may be required of mechanized engineers in connection with and incidental to their normal technical duties, as combat elements covering obstacles or crossings, or as potential reserves. The magnitude of the tasks already apparent, indicates the virtue of the accepted principle that engineers can contribute most to the success of an operation by concentrating on technical duties rather than having their capabilities impaired by employment on combat missions for which they are not primarily organized or equipped.

In connection with engineer technical missions, combat may be involved in a variety of forms. Engineer elements with reconnaissance detachments may be expected to meet hostile vehicles or detachments. An advance by force may be required to secure essential information concerning routes or areas. This fact would seem to indicate the desirability of making the engineer reconnaissance elements conform, in general, to the characteristics possessed by the cavalry elements with

which they are associated. The same considerations prevail in connection with engineer elements with security detachments. During the period of actual construction, there exists the necessity for the engineer contingent to defend itself against possible interruption by hostile mechanized or less mobile detachments. Similar defensive action may be required of engineer units and trains on the march as well as in bivouac.

The effectiveness of anti-mechanized obstacles is increased if covered by fire. What troops are to provide this defense? The answer, of course, rests with the cavalry commander; his policy cannot be anticipated with certainty. In the usual case it may be presumed that the engineers will continue to erect other obstacles, leaving the defense of those in place to appropriate elements of the cavalry command. However, it appears probable that circumstances will arise which will necessitate the assignment of engineer personnel to such work. The same conclusion may be drawn as regards the defense of bridges or prepared avenues of approach.

The use of engineers on strictly tactical missions of combat is normally exceptional, but is justified when the situation becomes so acute that the usefulness of the engineers for such a purpose outweighs their value for engineering tasks. The organization, equipment, and training of the mechanized engineers should be such as to fit them for such combat missions, with due consideration given the fact that it is a secondary mission.

SECTION III

MECHANIZED ENGINEERS

ASSIGNMENT.—In Sections I and II the discussion has been purposely generalized both as to the relative size of the mechanized cavalry and engineer units, and as to their organizational status. More specific conclusions as to the organization and equipment of engineers can be reached only after determining: first, the size of the mechanized cavalry unit, and second, the organizational relationship which may be employed.

Prior to the formation of mechanized organizations, the division was the smallest unit to which engineers were assigned as organic components. The division then represented the smallest unit composed of all the essential arms and services,

designed to be tactically and administratively self-sustaining and capable of conducting important operations by its own means. Although approved War Department tables of organization pertaining to higher echelons of mechanized cavalry are not available, tentative tables indicate that the mechanized cavalry brigade possesses the essential characteristics heretofore found only in divisions or larger units. The mechanized cavalry regiment, like the infantry and cavalry brigade, appears to lack the means characteristic of the next higher echelon. In keeping with these considerations, it seems logical to conclude that if required at all, engineers will be found in the mechanized cavalry brigade. Similar reasoning leads to the conclusion that engineer assistance required by the mechanized cavalry regiment assumes a different character, just as now exists in the case of the infantry or cavalry brigade.

The fact that engineer personnel should appear in the mechanized brigade has been assumed in the tentative tables of organization already referred to. The soundness of this conclusion is indicated by the numerous and important engineering tasks connected with the several types of operations outlined in the paragraph on "Tactical Employment." Similar conclusions have been expressed by military writers both in this country and abroad, in connection with mechanized units embodying many of the characteristics of the mechanized brigade.

The same conditions which prompt the inclusion of engineer personnel with the mechanized cavalry brigade, indicate the desirability of having such personnel an organic part, rather than reinforcing or attached. Other considerations lead to the same conclusion. The duties of an engineer unit with the mechanized brigade are continuous during periods of operation; they cover all phases of operations as well as the preparations preceding an operation. The situation is in marked contrast to the special circumstances which prompt the attachment of ponton trains or general service regiments to an infantry division. Material benefits accrue to the brigade as a whole by reason of joint training and close association between the members of the same combat team.

The engineer requirements of the mechanized cavalry regiment must not be overlooked. This unit is assumed to contain all the elements found in the brigade excepting only the field artillery component, the maintenance troop, and perhaps the

engineers. It possesses nearly one-half the combat strength of the brigade. It has been referred to as a self-contained administrative and tactical unit capable of independent operation in the execution of cavalry missions. Probable engineer missions may thus be similar in nature to those applicable to a brigade, but perhaps less extensive. The question of engineer assignment will depend on the organizational status of the regiment. If the regiment forms an element of a fully organized brigade, proper engineer assistance can and should be provided from the means available to the brigade. This is a normal brigade problem.

A different condition is presented if a mechanized cavalry regiment is constituted that is entirely divorced from a brigade, or if independent regiments be created and brigade organizations not be completed. Under these conditions, engineer assistance appears essential if the mobility and combat effectiveness of the unit is to be realized. Organic engineers are not contemplated in the tentative organization, and the idea appears sound. The attachment of a reinforcing engineer detachment affords a reasonable alternative which will receive further consideration in Section V.

Conclusions.—Assuming that mechanized cavalry units are to be organized in substantial accord with the tentative tables of organization, conclusions as to the assignment of engineer personnel may be summarized thus:

- (1) An engineer component of appropriate size and characteristics should form an organic part of the mechanized cavalry brigade.

- (2) Engineer personnel should not form an organic part of a mechanized cavalry regiment when brigaded.

- (3) An engineer group should be attached to an independent regiment in order to preserve its mobility and combat effectiveness.

DESIGNATION.—Due to its specialized missions and mechanized characteristics, an engineer unit designed as an element of a mechanized brigade will be difficult to compare with existing engineer organizations. However, its designation should conform, in general, to current practice. An engineer squadron is the organic unit in the cavalry division. An engineer troop is considered an appropriate reinforcement for a cavalry brigade (reinforced). To continue the parallel, it seems appropriate to consider a troop as a suitable designation for

the engineer component of a mechanized brigade. This designation has, in fact, been adopted in tentative tables of organization. In this connection it should be noted that the designation of such a unit may not justly describe its capabilities as compared with other engineer units bearing similar titles. The internal organization, as well as the equipment of a mechanized engineer troop is considered in subsequent paragraphs.

A TENTATIVE ORGANIZATION.—The organization of the mechanized engineer troop should be based on its probable missions. The discussion of these missions in Section II indicated the importance of mobility and speed of execution. These requisites in turn suggest that the engineer unit possess the maximum amount of mechanical equipment to conserve time, and yet avoid carrying unnecessary impedimenta that may adversely affect mobility. The latter consideration is complicated by the fact that the mechanized brigade may operate at a considerable distance from other forces and, therefore, must be organically equipped for a variety of eventualities. In short, the engineer troop must carry equipment and supplies for essential needs, and yet be so organized that the troop as a whole will not adversely affect the mobility of the brigade, nor engineer detachments unduly hamper subordinate cavalry units with which they may be operating.

An obvious solution to the problem appears to be the creation of highly mobile operating platoons equipped with a minimum of heavy equipment, but capable of performing a wide variety of pioneer tasks; and the formation of a troop headquarters with limited personnel but carrying special equipment and supplies for use by the operating platoons as required. This troop headquarters is in effect an equipment pool, to reinforce the operating platoons.

The question of the number of platoons and their subdivisions must of course be answered in the light of their probable missions. Both the combat engineer company and the motorized engineer troop contain two operating platoons of two sections each in addition to a company or troop headquarters. It will prove convenient to assume a similar organization for the mechanized troop, then test the efficacy of this organization in connection with the cavalry operations summarized in the paragraph on "Tactical Employment." Any defects which appear in this assumed organization can then be rectified.

Although the question of equipment is unavoidably involved in the discussion, the effect of organization is the central topic.

MARCHES.—Distant or route reconnaissance may be under brigade or column commanders. If under the former, accompanying engineer personnel can be drawn from troop headquarters; if under the latter, operating platoons, reinforced as required, can provide the personnel and vehicles. When the brigade marches in one column, engineer personnel can be distributed as required under any reasonable organizational plan. While moving in multi-columns, control will probably be decentralized to regimental or combat team commanders. As long as there are but two principal commanders, an engineer platoon is available for cooperation with each, further subdivision within the platoon being possible. Where three or more principal subdivisions of the brigade are created, engineer assignment becomes less satisfactory. One workable solution would be the division of one or both platoons into sections, each reinforced with such additional equipment as appears necessary. The work capacity of a section is relatively small.

The allocation of engineer means to advance, flank, or rear guards depends upon such a variety of considerations that any generalization is difficult. It involves the same basic factors as were just discussed. However, a reasonable concentration of engineer effort is desirable, and the detachment of an excessive proportion of engineer personnel on isolated missions is undesirable under any organization.

BIVOUACS.—At a halt, elements of the brigade may be less dispersed so that control is less difficult. Whether security measures are centralized under brigade control or decentralized to regimental or combat team commanders, appropriate subdivision of the engineer means can be effected under the proposed two-platoon organization. The construction of obstacles, camouflage, and road work will be simplified by the fact that all elements of the engineer troop will be relatively close together thereby facilitating the supply of materials and special equipment.

RECONNAISSANCE AND COUNTERRECONNAISSANCE.—Brigade reconnaissance missions were discussed at some length in the paragraph on "Assignment." Counterreconnaissance operations may be expected to require a somewhat similar organization, although the mission will be one of preventing hostile ground reconnaissance. In this case the engineer reconnaissance

vehicles with a detachment may have to be augmented by one or more vehicles of engineer personnel and supplies for the erection of road blocks, defensive works, and obstacles. Since the engineer detachment will be relatively small, it can be drawn from the operating platoons without seriously impairing the capabilities of these units.

ATTACK.—Much of the engineer work incident to an attack must precede the delivery of the main blow. This is particularly true of reconnaissance, efforts to limit hostile maneuver, reduction of obstacles hindering the advance, and the construction of obstacles required for the security of the attacker's flanks and rear. The allocation of engineers on such tasks appears relatively easy and offers few possibilities for testing the effectiveness of engineer organization.

During the attack it appears that the mechanized brigade may be tactically or geographically separated into four groups: (1) the maneuvering force, or main effort; (2) the brigade reserve; (3) the pivot of maneuver (relatively fixed); and (4) the trains or rear elements not participating directly in the engagement. Granting that the engineer requirements of each depend largely on specific circumstances, some generalization is possible. From a tactical viewpoint, the importance of each group follows the order named. The engineer effort should adhere to a similar priority.

The maneuvering force may require two major engineering tasks: first, facilitating the advance of the force, and second, assisting in the organization of captured terrain. Due to its importance and the necessity for rapid execution, assume that a platoon is assigned to this mission. Such a unit should provide adequate engineer assistance.

In second priority, the brigade reserve promises two engineer missions: the construction of obstacles and other security measures, and the preparation as well as marking of routes for future movements. The first of these missions may be closely allied with the engineer help furnished the pivot of maneuver, since these two groups may be in the same general locality. The preparation and marking of routes for the reserve presents a variable requirement which in general may be assumed to require only moderate speed of execution, and relatively small means. An engineer platoon less one section, should be able to perform these duties.

Engineer tasks affecting the pivot of maneuver will include the preparation of suitable fields of fire, and security measures on the flanks and rear. One operating section, perhaps reinforced with equipment, should be able to accomplish these tasks in the time available, especially if the remainder of the platoon, earmarked for use with the reserve, is sufficiently nearby so that the engineer work can be coordinated.

The trains or service vehicles possess a high degree of mobility but may require some pioneer work for their close defense. Personnel from these service elements must be impressed into service, utilizing the tools and equipment available to them for works designed to increase their own security. The cavalry vehicles are armed with machine guns for this purpose. Engineer vehicles must be similarly armed to provide for their own close defense.

The foregoing assignment is not to be construed as recommending attachment of the indicated engineer units to the several tactical elements, but rather approximates an engineer plan such as might be devised by the engineer troop commander. Under the assumptions stated, the proposed organization appears to lend itself to the performance of the tasks probable in an attack.

DEFENSE AND DELAYING ACTION.—As noted in the subparagraphs "Defense" and "Delaying Action," under the paragraph on "Tactical Employment," the cavalry brigade may be expected to utilize its mobility and shock-power even in defensive situations. That the same general tactical or geographical division of the cavalry command may obtain in defensive operations was indicated in the discussion of the attack. A similar apportionment of engineer personnel is not unlikely. However, there may be increased need for demolitions and obstacles.

RAIDS.—Although extensive reconnaissance and major destruction are the probable characteristics of a raid, the assignment of engineers and the suitability of the proposed organization is difficult to estimate without complete information as to the tactical plan. Provided adequate equipment be given the engineer troop, the two-platoon organization appears sufficiently flexible to meet probable requirements.

CONCLUSION.—Based on the brigade organization assumed in the paragraph on "Composition," and its probable employment as outlined in the paragraph on "Tactical Employment,"

the following conclusions as to the organization of an engineer troop are pertinent:

(1) A troop composed of two operating platoons of two sections each can function effectively in all normal operations of the mechanized brigade, provided:

(a) Each platoon is organized and equipped to perform routine pioneer work when separated from the troop.

(b) A troop headquarters is established to provide an equipment and supply pool to reinforce subordinate elements for specific tasks.

(c) At least two reconnaissance vehicles (armored cars) be incorporated in the troop headquarters, with one additional vehicle organic in each platoon, and other vehicles suitable for general reconnaissance purposes be available in troop headquarters as well as platoons.

(d) Ample demolition equipment be available, and a large proportion of the engineer personnel adequately trained in demolition work.

(2) A troop composed of three platoons of two sections each will provide added engineer strength and somewhat greater flexibility, but is open to the following objections:

(a) It will materially increase the size of the troop and hence the ratio of engineer strength to total strength.

(b) By increasing the vehicle strength of the brigade without contributing proportionate fire-power, a larger engineer unit tends to reduce the mobility of the brigade as a whole.

(c) It is not essential for the accomplishment of probable engineer missions.

(3) A troop of two platoons, organized under the principles indicated in sub-paragraph (1) above, can be considered an appropriate organization for the mechanized brigade until field tests indicate the necessity for modification.

SECTION IV

MECHANIZED ENGINEERS—EQUIPMENT

TRANSPORTATION.—The characteristics of engineer transportation will have a marked influence upon the effectiveness of the engineer unit. Reasonable cross-country and high road mobility are vital requirements. The capacity for self-defense

is a consideration; and finally, the suitability of the transportation for the contemplated loads must be checked. Commercial automotive design is showing such rapid improvement that it is difficult to specify the exact type of vehicles which gives evidence of providing the most desirable form of transportation. As a result of continuing study and tests, military vehicles are being improved and modified at frequent intervals. Under the circumstances, it seems desirable in this situation to designate vehicles by types rather than by specific characteristics. The vehicles mentioned are intended to represent the most approved forms which are in current use in the Army in general and the mechanized cavalry in particular. In avoidance of introducing an excessive number of special vehicles, it will be assumed that whenever possible, standard chassis will be used, and the minimum amount of special construction will be required in the body of the vehicle.

The need for armored cars has already been pointed out. Under the proposed organization, two of these vehicles will form the reconnaissance section of troop headquarters, and one car provided for each platoon as well as the troop commander—a total of five armored cars.

Personnel carriers for the engineer unit can be similar to those employed by the mechanized cavalry units. As now planned, these carriers are track or half-track fighting vehicles combining cross-country mobility with reasonable carrying capacity and a certain amount of protection for personnel and equipment. Each carrier transports one squad with its equipment.

Two men have been assigned to each cargo truck and special vehicle. This loading will permit certain specialists to ride with their equipment and also obviate the necessity for providing carriers for personnel other than operating sections of the platoon.

The practicability of trailers in an engineer unit is a controversial subject. The apparent economy in prime-movers must be weighed against decreased mobility. Although trailers are used in the present motorized troop and have been recommended on occasion for inclusion in a mechanized troop, this type of vehicle has been condemned as hard to handle and detrimental to mobility. Tentative tables for the motorized troop (Corps of Engineers, *Tables of Organization*, Table 468W, 19 January 1934) contemplate the elimination of all trailers.

Since a high degree of mobility is a prime consideration, it is believed that the use of trailers with mechanized engineers is not justified, and that an appropriate type of self-propelled vehicle should be substituted.

Motorcycles have been the subject of considerable criticism by several engineer officers who have had occasion to employ them in cavalry maneuvers. However, their use for reconnaissance and messenger service is frequently recommended, and is in fact contemplated under existing tables of organization applicable to mechanized cavalry units. Their use in mechanized maneuvers, for messenger service to supplement radio communication, has been found useful. Motorcycles have the disadvantage of being of little use except as conveyances for messengers or for such limited reconnaissance as one or two men can effect. On the other hand, light trucks can be used either for messenger service, transportation of larger and more effective reconnaissance groups, dispatch of demolition parties, personnel carriers, or light cargo vehicles. To an engineer unit, this wide range of usefulness presents distinct advantages not applicable, in full, to other branches. For this reason, motorcycles have not been provided in the engineer troop but light trucks have been added for messenger service as well as general utility.

One passenger car has been assigned to the troop headquarters. This is in accord with the contemplated equipment of mechanized cavalry units and has some merit. The car may be used for command purposes, messenger service, or reconnaissance. On the other hand, a car is not a necessity and could be replaced by a light truck or even a motorcycle without detriment to the engineer unit. As long as mechanized cavalry troops are so equipped, the engineers will no doubt be able to effect closer liaison by conforming.

Cargo vehicles within the troop have been confined to three types, all of which are either commercial products or types already in use in the army. Light trucks with pick-up bodies are commercial vehicles well adapted for messenger service and general utility. One such vehicle can be equipped to serve as a light repair truck. Commercial types of one and one-half to two ton dump trucks, similar to those used by the motorized engineer troop, are suitable for use as ration and baggage trucks, kitchen, and gas and oil carriers. By dumping their prescribed loads, these trucks become available for a

variety of engineer uses. Finally, the half-track type, or its successor, is used for engineer vehicles which may be required to leave the road or move with operating units. Such vehicles are the tool trucks, bridge carriers, demolition track, crane-excavator, and air compressors.

MACHINERY.—The provision of adequate engineer machinery promises to be essential if the engineer component is to function with speed and effectiveness. Certain types of machinery have already demonstrated their utility in connection with the work of the motorized troops of horse-cavalry units. The need for certain other items has been predicted, but the exact form requires special study and field tests. The technical considerations of this latter class are beyond the scope of the present study; it must suffice to indicate the character of the work which the machine is to perform.

A light tractor has been proposed as part of the equipment of the engineer squadron (motorized), as well as the mechanized troop. The machine is particularly valuable for making extensive road repairs and moving disabled vehicles. For road repair work the tractor must be used with road graders, scrapers, or drags. The bulk and weight of such equipment is considerable. Since mechanized engineers are not expected to undertake extensive road repair, a tractor is not considered an appropriate item of equipment. The numerous half or full-track prime movers within the mechanized brigade should suffice for moving disabled vehicles to nearby repair points.

Air compressors are useful for a variety of purposes such as drilling, bank excavation, tamping, and sawing. The need for such a tool was suggested in the paragraph on "Demolition and Obstacles." Air compressors have been included in the equipment proposed for British mechanized engineers, and tentatively proposed as standard equipment in our own motorized squadron. It will be assumed that an air compressor, with all requisite attachments, can be carried portee on a truck of the half-track type, capable of operating effectively off the road. Because of its great versatility, and the importance of road blocks and demolitions for which it is particularly adapted, this machine should be included in the basic equipment of each platoon.

A small, motor-driven water pump will be found useful for the establishment of water points, as well as for certain types of construction work. Such a unit can be carried in troop headquarters.

The need for a versatile machine in the nature of a truck crane, derrick, or excavating machine has been suggested by a number of officers. British engineers, concerned with mechanized forces, have suggested a 2½-ton derrick on a tool truck designed particularly for launching portable bridges. As a result of experiences with the mechanized force in the United States, vehicle cranes with a capacity of four tons were recommended for use with mechanized engineers in the proportion of one per platoon. Reviewing the possible tasks indicated by the discussion in previous paragraphs of this paper, the following types of work stand out as being appropriate for the machines now being considered:

- (1) Launching portable bridges.
- (2) Weight lifting, especially in connection with the repair of existing bridges, or the construction of new ones.
- (3) Loading heavy materials.
- (4) Pile driving.
- (5) Removing obstacles.
- (6) Excavating bridge or ford approaches.
- (7) Excavating trenches or obstacles.
- (8) Excavations incident to road repair.

Specific recommendations are difficult to make without considering actual designs and the performance of such designs on appropriate field tests. However, the following conclusions are based on a study of the theoretical needs, with due regard to the practicalities of design:

(1) Each tool truck in the engineer troop should possess a weight-lifting device of moderate capacity to enable it to assist in placing portable bridges, handle heavy materials, and remove obstacles. This device may either take the form of a light hand crane such as is common on commercial wrecking cars, or an A-frame such as is used by the British on their tool lorries.

(2) One versatile machine of greater capacity, normally moving with troop headquarters, should be capable of use as a power crane, pile driver, clam-shell or drag-line shovel. It should be on a self-propelled mount capable of reasonably high road speeds, and still possess the ability to move off the road. Such a machine has a variety of possible designations. In this paper it will be referred to as a crane-excavator.

Trench diggers have been proposed for use with British mechanized engineers, and mentioned in our own *Engineer*

Field Manual. In a rapidly moving situation it would seem that only infrequently would time permit the construction of extensive trenches, either as tank obstacles or as defensive works for personnel and weapons. The machine described in the preceding subparagraph can be employed on relatively small tasks of this nature. The addition of other and perhaps heavier machines specifically designed for trench digging would appear to lessen the mobility of the unit, without providing additional engineer means essential to its more probable missions. For this reason, no trench digger is contemplated in the mechanized unit.

Bridging machines of one type or other have been mentioned by several foreign writers. Most of them were designed for use in connection with tanks employed under the relatively stabilized situations obtaining on the western front during the World War. The essential feature of such machines seem to be their ability to launch a portable bridge while under fire, all operations being effected without exposing the personnel. The practicality of the scheme has been demonstrated, but the vehicle is of necessity a cumbersome affair with limited mobility. Until a design more suitable for operation with mechanized cavalry is provided, it seems desirable to omit such equipment from our mechanized units. Of course, bridging equipment will be required but it will be carried on ordinary vehicles suitable for cross-country movement, and therefore, not properly classed as bridging machines.

Gasoline shovels and road graders have recently been listed as standard equipment for the motorized engineer squadron. The excavating machine proposed in preceding paragraphs, above, provides a reasonable though less effective substitute for the gasoline shovel. However, the increased importance of speed tends to reduce the number of opportunities which the engineers will have to make major road repairs or complete extensive evacuation projects. For this reason, neither a gasoline shovel nor a road grader are considered essential machines for mechanized engineers.

Other machines such as power saws, concrete mixers, and scrapers will find insufficient use to warrant their inclusion in the list of essential machinery.

ENGINEER TOOLS.—Engineer units are provided with essential tools by the assignment to designated organizations, of specific allotments of complete tool sets, each suited for a

particular class of work. This procedure simplifies procurement and supply. In the field it facilitates work by permitting the delivery, in a compact unit, of all tools which a detachment may be expected to require for a given operation. For the same reasons, it appears advisable to continue this policy in the assignment of tools to the mechanized engineers. Since the mechanized troop closely parallels the motorized troop in organization, and will have many similar missions, there is no reason why full use should not be made of standard tool sets, even though a few individual items within a set appear to demand modification or substitution. In the discussion which follows, standard sets of equipment will be adopted where the need for a given type of equipment is indicated. Such sets will be subject to periodic improvement by the corps of engineers, and when assigned to a particular troop will always be somewhat modified by troop personnel.

Carpenter.—The combat company and the motorized troop are furnished carpenter sets of engineer issue at the rate of one per platoon. The company is provided with a supplementary set of quartermaster origin, containing additional and more specialized implements. This distribution is desirable for the mechanized troop as well. The platoon sets can be carried on the platoon tool trucks while troop headquarters moves the supplementary set on a headquarters truck, available for issue to the platoons upon request.

Pioneer.—Pioneer tools are grouped into platoon sets, issued at the rate of one per platoon to combat companies and motorized troops. This equipment is of particular value to a mechanized troop. The assignment of one set per operating platoon should prove adequate.

Demolition equipment.—The extended use of demolition measures which is anticipated in mechanized cavalry operations, necessitates the provision of more demolition equipment than is found in the organizational allotments of the combat company or motorized troop. Where the latter units are assigned one demolition set per platoon, the mechanized unit should have two. In addition, the troop headquarters should have two sets in its organic equipment to supplement that of the platoons. Although this provides six demolition sets for the mechanized troop as compared with two for the motorized unit, the need for the reinforcement is apparent from the missions anticipated in the paragraph on "Maps," and the con-

templated usage sketched in paragraphs on "Marches," "Bivouacs," etc. When the tactical situation demands extensive demolitions, all available engineer personnel must be equipped to assist. The engineer troop has been provided with adequate personnel and a suitable number of appropriate vehicles; the lack of demolition equipment must not limit its capability. Fortunately, the standard demolition set is conveniently small (5.9 cubic feet), and weighs but 134 pounds exclusive of the 100 pounds of explosive normally carried. The disposition of these sets on troop vehicles is indicated in Plates II and III. * One set has been assigned to the air-compressor truck, because of the probability that this machine will be used whenever extensive demolition is undertaken. It is possible, of course, to shift the demolition set to the platoon tool truck or to one of the personnel carriers as required. Two demolition sets are loaded on the troop headquarters demolition truck, and thus made available for use with that vehicle or reassignment to platoons.

Supplementary equipment.—Troop headquarters of an independent troop must assume the essential duties normally performed by the Headquarters and Service Troop of the Engineer Squadron. Not the least of these functions is the provision of additional tools and supplies for operating units. Due to the unusual position of the mechanized troop, no standard tool set can be found in existing tables which provides the essential elements for troop supplementary equipment. One must be devised. In principle, it should contain additional tools likely to be needed by the operating platoons to supplement their own, and in addition contain a reasonable quantity of expendable supplies ear-marked for platoon use. It will be similar in character to Unit Number 40 in the *Engineer Supply Catalog*, but smaller. The exact specifications for this equipment cannot be given at this time, since engineers have had insufficient experience with large mechanized cavalry units to justify conclusions. However, it seems apparent that a supply of heavy steel blocks (double, triple, and snatch), together with several hundred feet of heavy cable will prove necessary. In addition, there should be included a supply of expendable items such as drift bolts, spikes, nails, wire, etc.

[Diagrammatic Tables (II, III, & IV) pertaining to this study are at back of magazine.]

Drafting and duplicating equipment can well be limited to the standard company set which weighs but 76 pounds. This will provide essential equipment for rough engineer or topographical drafting and the reproduction of a limited number of prints. Although the duplicating equipment is of doubtful value in its present form, considerable experimenting is being done on substitute methods. It is desirable that means be furnished for printing road sketches quickly.

Miscellaneous.—Certain other items of equipment will prove necessary. The following sets have been included in the proposed organization for reasons which are obvious: photographic, pipefitting, sign-painting, sketching, and tinsmith. The illuminating set (gasoline lanterns) are omitted as being non-essential.

Summary.—The following table indicates the assignment of equipment sets to the several elements of the mechanized troop:

<i>Unit</i>	<i>Troop Head- quarters</i>	<i>Each Pla- toon</i>	<i>Troop Total</i>
Carpenter equipment, platoon, engineer, set.....		1	2
Carpenter and wheelwright, quartermaster, set.....	1		1
Demolition equipment, platoon, engineer, set.....	2	2	6
Drafting and duplicating, equipment, set.....	1		1
Library, reference, company, set.....	1		1
Pioneer equipment, platoon, engineer, set.....		1	2
Pipefitting equipment, set.....	1		1
Signpainting equipment, set.....	1		1
Sketching equipment, set.....	1	1	3
Supplementary equipment, mechanized troop, set..	1		1
Tinsmith equipment, set.....	1		1

ENGINEER SUPPLIES.—*Explosives.*—The demolition truck in troop headquarters was provided to carry a reasonable supply of military explosives. Sufficient capacity exists to transport 1000 pounds of explosive in addition to the antitank mines and demolition sets. Since large quantities of explosives will be required to carry out extensive projects, it is imperative that

full use be made of local supplies. Engineer reconnaissance agencies must be alert to the necessity of locating these local resources. The normal loads of explosives carried by the troop will be:

Troop headquarters.....	1000 pounds
6 Demolition sets @ 100.....	600 pounds
<hr/>	
Total.....	1600 pounds

Of this amount 200 pounds normally go with each platoon while 1200 pounds remain in troop headquarters.

Antitank mines.—The liberal use of antitank mines has been predicted by numerous writers. Provision has been made to carry approximately one hundred ten-pound antitank mines or an equivalent weight of other sizes in the demolition truck. For special operations requiring a greater supply, surplus cargo capacity exists within the troop on the light pick-up trucks (3) as well as the troop tool truck. It will be preferable, however, to have unusually large shipments sent forward in transportation furnished by higher echelons.

Camouflage.—Until the technique of camouflage applicable to mechanized units is more fully developed, the type and quantity of materials required for this work cannot be established. If each vehicle carries a net or cover for its own use, the engineer troop need provide but one or two extra ones to serve as replacements or for minor camouflage benefitting the brigade as a whole. These nets can be carried on the troop tool truck. Until the need for it is established no provision should be made for special paints, wire, netting, poles, or burlap.

Bridge material.—Previous discussion indicated the desirability of including one unit of portable bridge (approximately 30 feet) in the organizational equipment. This unit is transported on two half-track carriers attached to troop headquarters.

In addition to the portable bridge unit, the troop vehicles may transport a small quantity of timber or light metal members suitable for strengthening existing bridges and culverts, or spanning ditches. The exact nature of such material can be determined only after a study of the character of bridges common to a theater of operations, hostile methods of demolition, and the availability of local supplies. The troop commander must anticipate his requirements and maintain a supply of such materials as cannot be procured locally.

Prepared obstacles.—A certain amount of prepared obstacles or the construction materials therefor, will form an essential part of the load of engineer vehicles. The character and amount to be carried may well be left to the discretion of the unit engineer who can better weigh his probable requirements against the carrying capacity of this vehicle. The design of obstacles affords a broad field for utilizing ingenious expedients. A great variety of road blocks have been proposed among which are: cables, planks studded with barbed spikes, and coils of steel wire. Sufficient material must be available to the engineer unit to erect such obstacles as may be required for each particular operation.

Miscellaneous.—Items of individual equipment now issued to the personnel of motorized engineer units, should apply also to mechanized personnel. Engineer equipment furnished to the individuals or organizations of the cavalry brigade should be replaced from depots as required. The engineer troop should not undertake to maintain a reserve of these supplies for reissue to cavalry units.

OTHER SUPPLIES.—Rations.—Tentative plans contemplate that each mechanized unit provide itself with two rations in addition to the individual reserve ration. The engineer troop will carry one ration on the kitchen and one ration on the ration and baggage truck. The weight of one ration will be approximately 600 pounds. The reserve ration will be carried by the individuals in their packs or on their vehicles.

Water.—No special water-carrying vehicle has been included in the mechanized troop. As has been pointed out before, the water requirements will be small and to all practical purposes limited to the supply of kitchens, since individuals may be expected to have access to local supplies. It is assumed that kitchen trucks will be provided with containers designed to provide adequate water for messing purposes.

Gasoline and oil.—It is proposed to provide units of the mechanized brigade with fuel sufficient for two days' march of 150 miles each. Armored cars can carry sufficient for 250 miles. Reserve gasoline and oil in the necessary quantities will be carried in convenient drums on the gasoline and oil truck of troop headquarters.

Ammunition.—In order to conform to the logistical plan of the mechanized brigade, the engineers must carry $2\frac{1}{2}$ days of fire of ammunition, of which $1\frac{1}{2}$ days of fire will be on the

vehicles with the weapons. This leaves one day of fire to be transported by troop headquarters.

WEAPONS.—It is essential that all vehicles be equipped to provide for their own defense. For this reason, and in conformity with the practice in other units of mechanized cavalry, one light machine gun, caliber .30, has been placed on each vehicle except the light passenger car. Armored cars have been given the same armament as the corresponding cavalry vehicles, that is: 1 sub-machine gun caliber .45, 2 light machine guns caliber .30, and 1 heavy machine gun caliber .50.

The corporals, privates first class, and privates in the operating sections are armed with semi-automatic rifles caliber .30, identical to those provided for the personnel of the cavalry rifle platoon of the machine-gun troop. All other individuals within the troop are armed with a pistol.

The armament specified above differs materially from that now authorized for the motorized troop. However, it appears desirable to utilize the same weapons employed by the cavalry elements in order to simplify the maintenance and supply problem. If changes are made in the character of the weapons assigned cavalry units, similar changes should be effected in the engineer troop so that a minimum variety of ordnance matériel will be required within the cavalry brigade.

RADIO.—Radio communication will be quite as necessary for the engineer troop as for the other elements of the mechanized brigade. Communication may be required in the reconnaissance, command, administrative, or air-ground nets. Only by prompt communication between the engineer elements, and between the engineers and other units can essential cooperation be secured in a rapidly moving situation. For this reason, it seems desirable to include one radio set in each operating platoon and one in troop headquarters. Because of their missions and probable method of employment it is desirable to have one radio set in each of the two engineer reconnaissance cars of troop headquarters. A somewhat similar recommendation was submitted as a result of engineer experience with the Mechanized Force at Fort Eustis, Virginia.

SECTION V

PERSONNEL

OPERATING PLATOON.—As in the case of the present motorized troop and combat company, the platoon of the mechanized troop is designed as the fundamental work unit. It is provided with independent means for reconnaissance, messenger service, command functions, and general pioneer work. It is equipped with essential machine and hand tools, and sufficient personnel to perform effective work. The four squads of the operating sections provide one basic work unit—the customary yardstick for estimating labor requirements. However, because of the machine tools available to the platoon, and the number and character of the vehicles at its disposal, the work capacity of the platoon is materially greater than that of the motorized platoon as now constituted. The flexibility of the platoon is increased by division into two operating sections, each commanded by a sergeant. The section, in turn, contains two trucks, each of which carries one squad under the command of a corporal. In all essential particulars, the proposed platoon organization conforms to that of the older engineer units. A graphical representation of the operating platoon is presented in Plate III. It has a total strength of one officer and 43 enlisted men.

TROOP HEADQUARTERS.—The composition of troop headquarters differs radically from that of any existing engineer organization. The difference is necessitated by two practical considerations: first, the engineer functions of the mechanized troop are somewhat unusual particularly as regards reconnaissance; and second, being a separate detachment, troop headquarters must assume all essential functions normally performed by the headquarters and service troop of the engineer squadron.

The first of these considerations necessitates the addition of a variety of specialists. The reconnaissance staff sergeant has immediate supervision over the two reconnaissance armored cars, being assisted by one sergeant as car commander of the second vehicle. The great importance of engineer reconnaissance suggests at once the desirability of placing an officer in charge of this activity. On the other hand, well trained noncommissioned officers should be able to perform the field work. In the majority of cases, decisions as to what engineer

work must be undertaken, as well as when and where, must be made by the troop commander after studying all reconnaissance reports in the light of the tactical requirements of the brigade as a whole. For this reason, no commissioned officer has been designated as reconnaissance officer. The staff sergeant can serve the troop commander as an agent in securing the most effective coordination between the reconnaissance elements within the troop. One sergeant has been designated as demolition foreman to assist the troop commander in demolition plans as well as the supply of the necessary materials. The camouflage foreman (sergeant) has similar responsibility in the camouflage field. When properly trained, this non-commissioned officer becomes a valuable assistant not only for the engineers but other elements as well.

The fact that the mechanized troop has no headquarters and service troop to husband it, has necessitated the inclusion, in troop headquarters, of a variety of specialists. Their designation is patterned on that of the motorized headquarters and service troop, but their rank and ratings have been lowered to keep them in line with the platoon specialists. The number and duties of these specialists can be readily determined from Plates II and IV. Although the number of noncommissioned officers and specialists assigned to troop headquarters is materially larger than that obtaining in the motorized troop, the increase appears not only desirable but necessary.

TRAINING.—In view of the comparatively small number of men available in the engineer troop and the multiplicity of the duties required of them, it is apparent that small need exists for basic privates—if by that term is meant strong-backed individuals with few, if any, engineering qualifications. On the other hand, there is a pressing need for exceptionally skilled engineer soldiers with broad training. It is particularly important that a large number of soldiers be qualified as drivers, capable of operating any of the vehicles in the troop and effecting routing maintenance and adjustments. For this reason, no drivers have been included in the list of specialists, it being assumed that on each vehicles at least one individual will be qualified as a driver in addition to his indicated specialty, and will be detailed by name to function as a driver in addition to his other duties. It is important, also, that all engineer soldiers be proficient in the handling of explosives, and be adequately trained in the operation of their individual arms, as well as

the automatic weapons found in their unit. These qualifications, together with a general ability to handle engineer tools, must be considered basic qualifications.

It is apparent that even with adequate equipment and appropriate organization, the mechanized troop cannot function effectively unless the personnel is thoroughly trained, individually and collectively. With mechanized cavalry, more than with any other force, engineer tasks will take the form of intelligent improvisations. Due to the lack of data bearing on engineer functions with large mechanized units of the type contemplated in this discussion, it is impossible to compile a comprehensive manual for the training of newly organized units. Training must be based upon field experience rather than theoretical study. Peace time organizations should include a sufficient number of mechanized troops to supply the engineer requirements of such mechanized cavalry units as are expected to participate in the initial phases of a war.

In keeping with this thought, the writer is of the opinion that when an independent mechanized cavalry regiment is created, a mechanized engineer troop (less one platoon) should be organized. The engineer unit should be garrisoned in a locality convenient to the cavalry regiment, and required to participate frequently in actual field maneuvers with the regiment. Later, if the mechanized regiment is expanded into a brigade, the engineer troop can be brought up to full strength rapidly, with reasonable assurance that the engineer contingent will be prepared to carry on its work in a satisfactory manner.

SECTION VI

CONCLUSIONS

GENERAL.—As a natural consequence of the lack of any data based on engineer experience gained from actual tests involving an appropriately equipped engineer unit operating with a complete mechanized cavalry brigade, such conclusions as can be drawn relating to the proper organization and equipment of an engineer unit must be considered as statements of opinion rather than of fact. The opinions expressed in the conclusions which follow represent an attempt to combine the many and often conflicting ideas of military men in this country and abroad, into concrete form. The result is a reasonable

basis for actual test, to be modified as future experience may suggest.

ORGANIZATION.—An engineer troop (mechanized), organized as shown in Plate IV, is a reasonable unit to be attached to or to cooperate with mechanized cavalry. This unit contains a troop headquarters and two platoons of two sections each, with the following total strength:

Officers.....	4
Enlisted men.....	116
Vehicles.....	30

EQUIPMENT.—The essential equipment for the mechanized troop is listed in Plate V.

ASSIGNMENT.—An engineer troop (mechanized) should form an organic part of the cavalry brigade (mechanized).

No engineer detachment should be included, organically, in the cavalry regiment (mechanized). Engineer assistance to a cavalry regiment temporarily separated from its brigade can be effected from the engineer means available to the brigade, in accordance with probable requirements.

A mechanized troop (less one platoon) is an appropriate engineer unit to operate with an independent cavalry regiment not brigaded.

PLATE V
SUMMARY OF EQUIPMENT
ENGINEER TROOP (MECHANIZED)

<i>Unit</i>	<i>Troop Head- quarters</i>	<i>Each Pla- toon</i>	<i>Troop Total</i>
ORGANIZATIONAL EQUIPMENT:			
Carpenter equipment, platoon, engineer, set.....		1	2
Carpenter and wheelwright equipment, quartermaster.....	1		1
Demolition equipment, platoon, engineer, set.....	2	2	6
Drafting and duplicating equipment, set.....	1		1
Library, reference, company, set.....	1		1
Photographic equipment, company, set.....	1		1
Pioneer equipment, platoon, engineer, set.....		1	2
Pipefitting equipment, set.....	1		1
Portable bridge, 30' unit.....	1		1
Sign-painting equipment, set.....	1		1
Sketching equipment, set.....	1	1	3
Supplementary equipment, mechanized, troop.....	1		1
Tinsmith equipment, set.....	1		1
MACHINERY:			
Air-compressor, with attachments.....		1	2
Crane-excavator, half-track.....	1		1
Trucks, demolition, half-track.....	1		1
Trucks, tool, half-track, with hoist.....	1	1	3
Water pump, gasoline.....	1		1
VEHICLES:			
Armored-cars.....	3	1	5
Car, 5-passenger, sedan.....	1		1
Cars, half-track, personnel.....		4	8
Crane-excavator, half-track.....	1		1
Trucks, dump, 4x2 (2dt), 1½-ton.....	3		3
Trucks, pick-up body, ½-ton.....	1	1	3
Trucks, half-track, cargo.....	4	2	8
Truck, repair, 4x2 (2dt), 1½-ton.....	1		1
Total.....	14	8	30
WEAPONS:			
Guns, machine, light, cal. .30.....	16	9	34
Guns, machine, heavy, cal. .50.....	3	1	5
Guns, sub-machine, cal. .45.....	3	1	5
Pistols.....	32	12	56
Rifles, semi-automatic, cal. .30.....		32	64

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Section 2

ABSTRACTS OF FOREIGN-LANGUAGE ARTICLES

This section contains abstracts of important articles from foreign military periodicals; the remaining articles for each magazine are listed in Section 4.

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ANTIAIRCRAFT DEFENSE OF A CORPS

["Vom Luftschutz eines Armeekorps," by M. Braun.
Militär-Wochenblatt, 11, 18 July 1936]

Abstracted by Major E.F. Koenig, Infantry

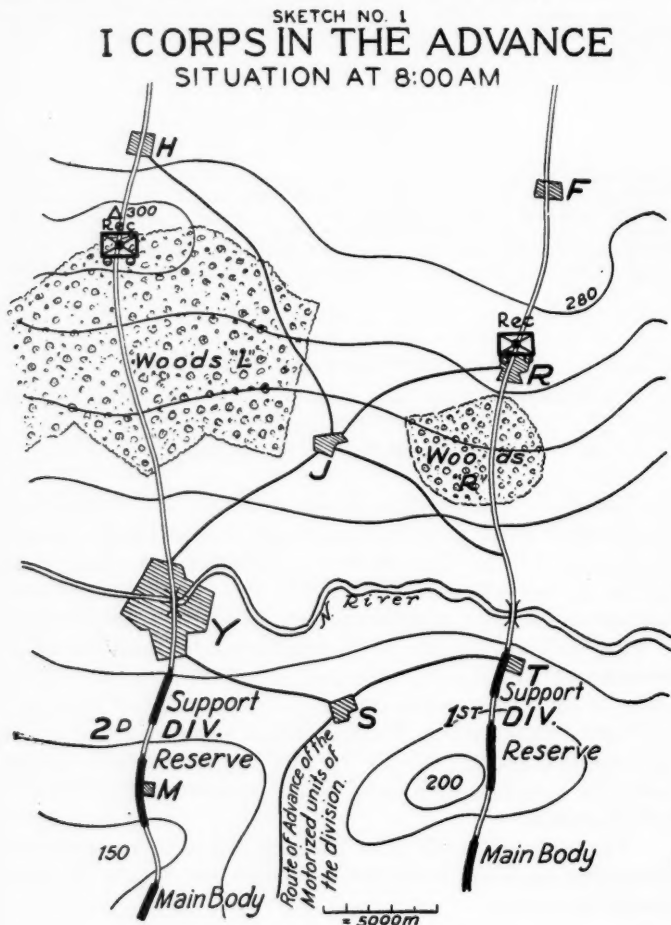
The motor was the victor in the last war—that in Ethiopia. Every march column, even defensive position, and every assembly position of the Ethiopians was scattered and neutralized by the Italian aviation. Of course, the Ethiopians had no antiaircraft facilities or training, and the tendency on the part of many military writers is to argue that for that reason a modern army could hardly be expected to profit from the experiences of the Ethiopians in this recent war. On the contrary, the overwhelming effect of aviation and motor transport, and the universal use made of it by the Italians, should be the basis of a complete revision of our ideas in regard to antiaircraft functions.

The best way to visualize the situation is by means of an illustrative problem, based on a modern conception of antiaircraft operations.

ILLUSTRATIVE PROBLEM (See Sketch No. 1)

THE SITUATION

1. *Enemy*.—Scout cars are in contact with the enemy, who is advancing from the north. It is anticipated that the corps will meet the enemy north of the L-Woods today.



2. *Mission of the corps*.—To attack the enemy and drive him north.

3. *Time*.—20 May, 8:00 AM. Weather: clear. Country: friendly.

4. *Air situation*.—At present the air over the corps is controlled by a friendly pursuit squadron. In general the aviation of Red and Blue is of equal strength.

5. *March formation*.—Normal. Special air-defense formations have not been ordered. Air alarm: Five short bugle blasts. Green Very light (for use by friendly aviation only); Red Very light.

6. The 3d Division follows the 1st Division at a distance of about 10 miles. Corps troops follow the 2d Division by bounds. The motorized units of the 1st and 2d Divisions have their own road up to the bridge.

7. *Terrain*.—Rolling country. Woods clear of underbrush. Offer concealment from the air. Six-wheeled trucks can travel cross country, especially the antiaircraft artillery. River 80 to 100 yards wide. Usable for pontons. Bridges: for local traffic. Not protected by antiaircraft units. Town Y, 3,000 inhabitants. Very narrow streets. Both roads are first-class roads.

8. *Aviation landing fields*.—For 1st Division southwest of T, for 2d Division south of Y are now being established. Advance guards equipped to receive and have aviation pick up messages.

9. There is no corps reconnaissance detachment. No division aviation.

10. The advance guards consist of reinforced infantry regiments.

11. No restrictions have been issued to antiaircraft fires.

12. On 20 May there have been no hostile air attacks by 8:00 AM. No orders for the halt have been issued. The average advance of the corps so far is 10 miles.

REQUIREMENT

The employment of antiaircraft weapons.

ORGANIZATION

Corps antiaircraft artillery:

3 batteries of 4 75-mm. AA guns (each battery has MGs for close-in defense)

1 battery of 6 37-mm. AA cannon

2 50-cal. MG. Companies

1 Searchlight and sound locator battery

1 Company of the AAIS. This company is divided into three platoons, each of which can establish a system of air scouts, with the necessary communication system to cover an area 18 miles wide, and 12 miles deep.

Headquarters and communications battery.

A SOLUTION

The Corps Antiaircraft Artillery Regiment

The gun battalion.—It moves between the two marching columns, and guards the advance of the corps. Batteries leap-frog 7,000 to 8,000 yards apart. Forward battery abreast of the Advance Guard Reserve. The battalion commander, who has nothing to do with fire control, supervises the leap-frogging. River crossing for the battalion: either between support and reserve, or between advance guard and main body. Mass of the artillery on the road of the 1st Division owing to the narrow streets of Y. (This is very important, or there will be no anti-aircraft protection on the far side of the river. This requires a corps order, and coordination with both divisions.)

The cannon battery.—This unit should be sent to guard the two bridges, the mass to Y, parts to T. It must remain here until the entire corps has crossed the bridges. These are the most vulnerable points of the entire advance. The corps commander should seriously consider a reinforcement of this unit, as it is inadequate. He could use the antiaircraft machine guns, infantry machine guns, or even consider passive means, such as a smoke unit of the chemical troops. Bridge commanders should be provided for, whose duty will not only be engineering and traffic control, but who will take over the responsibility of their protection against aerial attacks.

The machine-gun battalions.—This is attached to the divisions. One company (less one platoon) to the 1st Division; one company to the 2d Division. At present the 2d Division is in a more dangerous situation than the 1st Division, because it must march through Y, which is an excellent target for the hostile aviation. After crossing the river the situation changes and the 1st Division is the more vulnerable, for it advances over open terrain, while the 2d Division has the cover of woods

during its march. As the advance progresses the situation is constantly changing. Owing to the fact that the antiaircraft artillery is motorized, the changes in distribution can usually be effected without a great deal of difficulty.

The divisions in turn break up the antiaircraft machine-gun companies into platoons, and have them advance by bounds in the same manner as the gun battalion did for the entire corps. The leading unit should be abreast of the support of the advance guard. The infantry will object to this constant rushing by of the antiaircraft machine guns, especially on narrow roads, but there is nothing that can be done about it.

The division commander, in committing these units must designate the parts of the column to receive priority in anti-aircraft defense. In this situation the advance guards and head of the main body will be the most important units to protect until they have at least crossed the river.

The antiaircraft intelligence service.—Not necessary in this situation. Its work does not begin until contact has been made. It marches with the searchlight battery with the other corps troops. This does not mean that it always does so. In many situations it can, in view of its motorization, be building up its intelligence net to connect with that of the army anti-aircraft intelligence service.

This company is so mobile that it could be used during the advance by platoons, leap-frogging each other.

Air warnings.—It is a rule that each unit details a pair of air scouts. In view of the contemplated river crossing, however, it is believed this is not sufficient. A mounted patrol riding abreast of each battalion would be advisable as an additional precaution.

Machine guns.—The continuous employment of machine guns during the advance by bounds or leap-frogging, is physically impracticable. They can not stand the pace. Only the motorized units of the antiaircraft artillery regiment can accomplish this mission. It is practicable, however, to employ unit machine guns once during the advance to cover particularly vulnerable points en route. In this situation the advance guard of the 1st Division should send its machine guns to T, and north of the bridge near T. That of the 2d Division to Y and to the south edge of the Woods L, while the division is climbing out of the river valley. Such advanced movements are possible in view of the protection furnished by the recon-

naissance detachments (a few cyclists or mounted men can be detailed for close-in protection). (A modern infantry regiment without mounted men, cyclists, or motorcyclists is inconceivable.)

Command post.—The antiaircraft artillery regimental commander is normally with the corps commander, but not at all times. More important is the requirement that he be so located that he can direct the employment of his unit. He is usually represented by a liaison officer. This liaison officer and the aviation liaison officer should become inseparable. They have much in common. The aviation certainly can assist in warning the command of the approach of hostile planes, and also inform the antiaircraft artillery when its pursuit squadron can no longer control the air.

SECOND SITUATION

(See Sketch No. 2)

1. Enemy has stopped his advance and halted on the line: 135—D—E. It is unknown whether this is his outpost line of resistance, his main line of resistance, or merely advanced troops pushed ahead. Five miles farther north is a larger, more strongly occupied defensive position. The corps commander has decided to capture the position: D—E today.

2. The enemy has air superiority.

3. The first-line divisions are developing and preparing to go into action under cover of their artillery.

4. The corps artillery is moving into position.

5. The division of the second line is approaching the river.

6. The hostile artillery is firing on the north edge of woods L, and on H and F.

7. A coordinated hostile air attack against the bridge at Y has been repulsed.

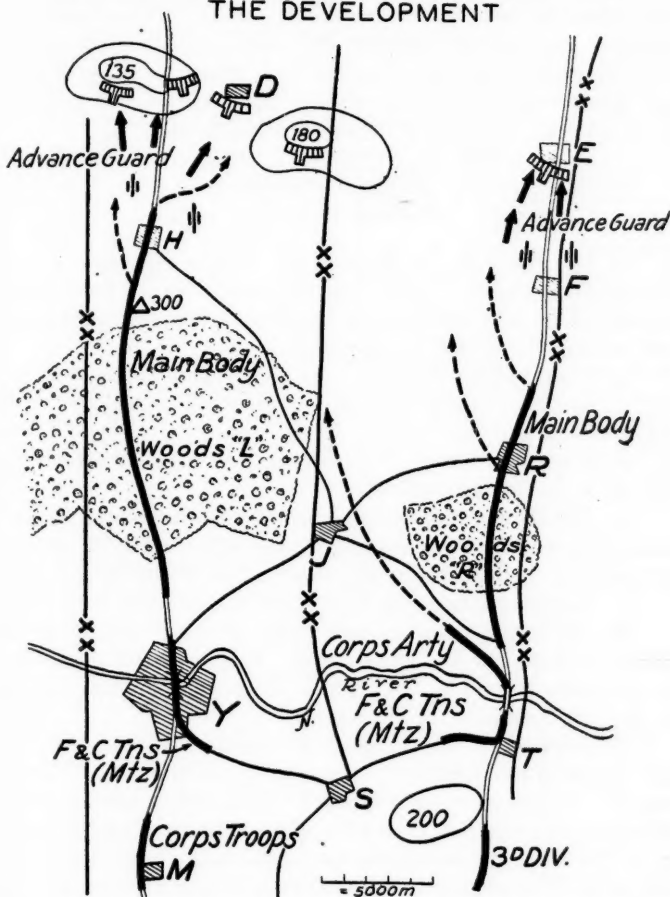
8. The rear echelons of the 1st and 2d Divisions are following the corps troops along the left roadway.

The front-line divisions are no longer as vulnerable as they were. The sensitive points are back at the river, the divisions of the second line, the corps troops, and the rear installations.

Recommended employment of the gun battalion: Woods L—Y—Woods R. Formation: triangular, point to the south; length of each side, 4,200 yards. The cannons remain at the

bridges. Machine guns: 1 company attached to 3d Division, 1 platoon each to the 1st and 2d Divisions, 1 platoon to corps command post.

SKETCH NO. 2
SECOND SITUATION 3:00 PM
 THE DEVELOPMENT



This brings up the point that there should be one anti-aircraft machine-gun company (caliber .50) for each division. These units have to protect not only the troops, but the motorized columns, and the supply installations. A company of three platoons is the very minimum.

In spite of the fact that the Ethiopian Imperial Guard was equipped with the Oerlikon anti-aircraft machine gun, as well as the Southern Army, they only brought down three Italian planes (one a bomber). This can not be wholly charged to lack of training. To be attacked with ball ammunition is not the same as maneuver conditions, where the anti-aircraft machine guns always register 100% hits. A Serbian officer recently wrote that each battalion of infantry and artillery, and all corresponding units should have at least one platoon of anti-aircraft machine guns attached to them.

THIRD SITUATION
(See Sketch No. 3)

1. The attempt to capture the hostile position: D—E before dark, failed. There was no time left to renew the attack. The corps commander decided to form for an attack and resume the attack at daybreak.

2. The supply establishments of the divisions are moving up.

3. The 3d Division will march at night to the cover of the woods L and R.

4. Any corps troops that have as yet crossed the river, will do so during the night.

5. Important supply establishments: Advanced army ration dump at J; corps tank repair park at Y; fuel at T. Army ammunition distributing point, south edge of woods R.

6. Hostile aviation has been very active since dark.

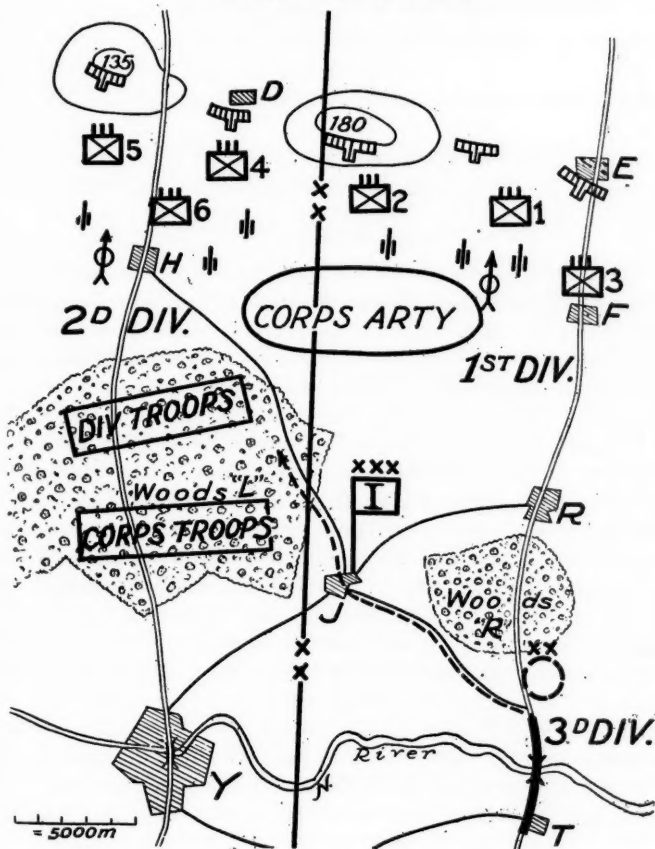
At night the enemy is tied down to easily determinable points, such as the principal roads. Danger exists primarily for the towns Y and T, the bridges, the supply point at woods R, and the marching 3d Division.

Employment of the anti-aircraft artillery.—Break up the gun battalion (an exceptional case), two batteries near Y, one near T. Set up searchlight battery. The anti-aircraft cannons remain at the bridges. The bulk of anti-aircraft machine guns to 3d Division, the remainder to supply point near woods R, and to J. The anti-aircraft intelligence service remains where committed, but establishes a chain of sentinels from E to R, and from Hill 135 to woods L.

The 1st and 2d Divisions protect themselves with their organic machine guns. A plane of the corps observation aviation must fly over the area to check camouflage. This is an

important part of defense against aircraft. Possibly the corps commander flies over his corps himself.

3^D SITUATION SKETCH NO. 3 NIGHT 20-21 MAY



THE RUSSO-POLISH WAR, 1919-1920
Non-critical and Critical Views*

(Conclusion)

["Der russisch-polnische Krieg 1919-1920. Unkritische und kritische Betrachtungen," by Colonel Alfred von Wittich. *Militärwissenschaftliche Mitteilungen*, March 1936]

Abstracted by Major F. During, Infantry

**V.—FROM THE BATTLE OF THE VISTULA
TO THE END OF THE WAR †**

The Polish Counter-Offensive on the South Front

At the time when the remainder of the Russian North Front withdrew to the Njemen (Niemen), Budennij threatened the Polish South Front. He had finally decided to comply with orders of the Russian commander-in-chief Kamenew, to advance in a northerly direction toward Zamosc-Lubin, but as his cavalry did not reach the Huczwa River until the last week of August 1920, the Poles had time to take necessary counter-measures. The Polish 2d Legionnaire Division was ordered to the south flank of the Polish Third Army, and the Polish 10th Division was directed to advance on Zamosc. In addition, an attack group under General Stanislaus Haller, consisting of the Polish 13th Division and 2d Cavalry Division, was formed on the north flank of the Polish Sixth Army. (See Sketch No. 20.) Budennij continued his advance but was stopped in front of Zamosc. He was now threatened with an envelopment by the Poles and decided to withdraw across the Bug River. After having practically annihilated the Russian North Front, and having forced Budennij's withdrawal, the Poles decided on an offensive against the Russian South Front, which necessitated a strengthening of the forces on the south. The plan for the Polish offensive was to have their Third Army and the north flank of the Sixth Army make a frontal attack across the Bug River; the south flank of the Sixth Army and the Ukrainian Army was to envelop the south flank of the Russian Fourteenth Army. (See Sketch No. 21.) The newly organized

*See RML No. 52, page 43; RML No. 55, page 43; RML No. 58, page 39; and RML No. 62, page 51, for previous installments of this series.

† [Maps pertaining to this abstract are at back of magazine.]

Polish Third Army, under command of General Sikorski, consisted of the following three groups:

Group Balachowicz (7th and 19th Divisions) in the area near Cholm with motorized infantry and armored cars near Wtodawa. This latter force was to make an envelopment via Brest-Litowsk—Mokransy-Ratno.

Group Haller (9th and 13th Divisions and 2d Cavalry Division) in the area Hrubieszow.

Group Zeligowski (10th Division and one brigade) near Sokol.

The Polish Sixth Army, under command of General Lamezan-Salins, consisted of two groups:

Group Jedrzejewski (4th, 5th and 6th Divisions) between Kamionka—Krasne—Przemyslany; and

Group Latinik (8th and 12th Divisions and a cavalry brigade) in the area: Chodorow—Halicz. South thereof was the Ukranian Army under General Pawlenko.

The offensive began between 12 and 14 September. Under pressure of the Polish Third Army, which took Wladimir-Wolynski on 14 September, and Kowel on 15 September, the Russian Twelfth Army and Budennij's Cavalry were forced to withdraw via Rowno. The Russian Sixteenth Army withdrew to the north, followed by the Ukranian Army, which reached Tarnopol, on 18 September, Jampol on 21 September, and Zaslav on 23 September.

By the middle of October the Poles had reached the line shown on Sketch 21. Even though the world powers did not want the Poles to obtain so much territory, it was Pilsudski's intention to advance as far as possible in all directions.

The Battle of the Njemen (Niemen)

(20 September to 18 October)

Tuchatschewskij, who had retained command of the Russian forces in spite of the disastrous results of the Battle of the Vistula, decided on a counteroffensive. As soon as the Poles stopped their pursuit he began to reorganize four new armies, which were located on 10 September as follows:

Fourth Army east of Brest-Litowsk

Sixteenth Army in the Bielowiez area

Fifteenth Army in the Wolkowysk area

The Third Army in the area south of Grodno. The Lithuanian boundary was north of Grodno.

The Polish high command, becoming aware of the Russian intentions, immediately prepared for another offensive on the north, which was to start before the Russians could complete their preparations. Two plans were considered by the Poles.

General Rozwadowski, the Polish Chief of Staff, wanted to make a secondary attack on the Njemen (Niemen) front in order to contain the Russian forces there and, using all other available divisions he intended to envelop the Russian south flank and drive them north via Lida—Wilna to the coast. Pilsudski did not approve of this; he wanted to execute a breakthrough in the direction of Mosty and an envelopment of the Russian north flank in order to drive them to the south. This latter plan was adopted and the Polish regroupment was as follows:

The Second Army (1st and 3d Legionnaire Division, 19th Division, 21st Mountain Division, Volunteer Division, 2d and 4th Cavalry Brigades), north and south of Grodno. In rear of the Second Army, between Augustowo and Suwalki was the Group Osinski (17th Division, Siberian Brigade). South of the Second Army was the Fourth Army (11th, 14th, 15th and 16th Divisions), and on the south of this army was the Group Krajowski (18th Division and Group Batachowicz). (See Sketch No. 22.) The Polish regrouping was completed on 19 September.

On 20 September the 21st Mountain Division and the 3d Legionnaire Division started the offensive. On 23 September the Poles attacked along the entire front but met with strong Russian opposition on the north, and it was not until 26 September that the Poles were able to take Grodno.

The Polish Fourth Army took Wolkowysk on 23 September. The Russian Fourth Army counterattacked on 24 September and recaptured the town. On 25 September the Russian Fifteenth Army withdrew and the Poles took Mosty. The northern flank of the Polish Second Army advanced on 24 September to the railroad line: Grodno—Wilna; Polish cavalry even reached Radun, threatening the north flank of the Russian Third Army. By the end of September the Polish Second Army had reached the area: Lida—Nowogrodek, while the Polish Fourth Army was at Baranowiczi and the Group Krajowski at Tuninac.

The Russians were now withdrawing all along the line. To protect its own border the Lithuanians had troops south

of the line: Olita—Wilna—Smorgon. (See Sketch No. 23.) This forced the Poles to establish a new front facing north. A Polish Third Army was again organized for that purpose, consisting of the 17th, 19th, 4th and Volunteer Divisions, and the Siberian Brigade. General Sikorski was placed in command of this army. The battle of the Njemen was a great Polish success, not only because it prevented the planned Russian offensive, but the Poles were able to advance about 60 miles in ten days.

Armistice—Peace

On 12 October the Polish advance had reached the line as shown on Sketch No. 23. The occupation of Wilna was of great political significance. After the battle of the Vistula an agreement had been reached to leave Wilna to Lithuania, but nevertheless, Pilsudski gave orders to General Zeligowski to take the town. This proves that in politics as in war, agreements are only scraps of paper. An armistice was concluded between the Russians and Poles on 12 October 1920 and peace was signed on 18 March 1921, which fixed the boundary between the two nations as shown on Sketch No. 23.

Due to the occupation of Wilna, Lithuania and Poland came to no agreement and no peace treaty was signed. Lithuania wanted the area around Wilna because of the agreement previously mentioned, but Poland refused to concede this to Lithuania and on 12 April 1922 a plebiscite gave it to Poland.

The Russo-Polish War was a war between nations having poorly trained and somewhat improvised troops. It was a primitive war, in which leaders of all grades disobeyed orders, and discipline was lacking. It was not a war of masses and matériel; war in the air was unknown, and motorization played only a small role. But it was a war of movement in which great demands were made on troops to march back and forth. As in the World War, the infantry carried the burden throughout the war. Cavalry came again into its own during the war. Because of the lack of munitions and guns, artillery played a minor role. The importance of communications and liaison was clearly brought out.

‡ The military-geographic conditions in Poland and Russia have not changed in the last 15 years, but the military-political situation is entirely different. While Poland could not keep pace with Russia's preparedness, she now has an army which

is far superior to that of 1920. In a future war the air arm will play an important role, as will motorization and mechanization. But we must not overlook the fact that eastern Europe is quite different in roads, terrain, etc., from western Europe. During certain periods of the year roads will be impassable. Napoleon experienced this in 1806 and 1812 and he called the mire and mud of Poland a "fifth element." This "fifth element" is of great importance from a military standpoint. The finest prepared plan of operations will be nothing but a plan, if, for instance, motorized units cannot move, and it is then that horse cavalry will come again into its own.

MODERN TRENDS IN FOREIGN INFANTRY

["Tendances actuelles des Infanteries étrangères," by Lieutenant Colonel Frenot. *Revue d'Infanterie*, February 1936]

Abstracted by Captain Wendell G. Johnson, Infantry

There is a universal tendency to seek rapid decisions, movement, and maneuver, and to avoid stabilized situations. Fire-power has become the new divinity of modern combat, with the result that armament has increased, matériel has been improved, attempts are being made toward better utilization of means, and a constant study and adoption of new models is going on. In most countries great effort is made to improve matériel, particularly mechanical, armored matériel. Then, in the light of such trends, what becomes of infantry? This can be briefly answered by showing that infantry is still held to be the predominant arm in most armies, but that it is an infantry which is *modernized, mobile, maneuverable*, and graced with great fire-power, capable of meeting diverse situations and even controlling the battlefield.

In England, tanks and infantry each act on their respective terrains in an independent fashion, and if English opinion admits, in certain circumstances, infantry-tank cooperation, it rejects in every case the subordination of tanks to infantry.

Other armies recognize the utility of mechanized detachments, but reserve the principal role for infantry, accompanied or not by tanks, and motorized in varying degrees.

Germany pays particular attention to the tactical employment of the antitank gun. German military writers emphasize that in the face of tank attacks in mass and depth, antitank

weapons must be concentrated in the zones that are not protected either naturally or artificially. Inasmuch as it will seldom be possible to interdict the menaced zone by the fire of these weapons, without solution of continuity, it will usually be advisable to hold a mobile reserve of antitank weapons in rear of menaced sectors. This belief oftentimes leads the Germans to conclude that the tank is still the best antitank weapon. But this opinion is not yet very widely held in Germany; the German Army counts above all on its antitank guns, which it has extensively distributed to all its units.

The Germans have adopted a new antitank mine, consisting of an elliptical disc from four to six inches high, which functions either by being crushed or by pulling a pin.

Besides their light minenwerfer (75-mm., 3500-yard range), the Germans have put a 37-mm. gun into service; they are studying or experimenting with other models varying from 20 to 50 millimeters. Their organization up to now prescribed a section of two antitank cannons per infantry battalion, and light minenwerfers in the regimental echelon.

Recent modifications, however, have taken all this matériel from the battalion to group it in a motorized company (9 guns) of the regiment.

Likewise in the division, which only had a single motorized company of 9 antitank guns, there is now an antitank battalion of three companies of 9 guns each. An example of provision for defense in depth, because there are now 54 antitank guns in each division.

The Germans believe, in principle, that the regimental 37-mm. guns are to be used on the position along with the other arms, and that the division guns should be held behind to be used in mass against the tanks that have penetrated the infantry lines, in order to prevent them from reaching the artillery position. This motorized detachment of the division thus becomes the mobile reserve.

England has tried:

- (a) A company of 3 platoons of 2 antitank guns each.
- (b) An antitank unit of 3 companies, each having:

A platoon of mine placers

Three platoons of 8 antitank guns each.

This would give the unit a total of 7,150 mines and 72 guns. But the type of gun has not yet been determined, nor is it known to what echelon the unit will belong.

The support battalion of the present experimental brigade has a company of four platoons of four guns each.

Italy is looking for matériel; at present it uses four 65-mm. mountain guns per regiment.

Japan gives each machine-gun company a 37-mm. gun and each regiment a platoon of six 70-mm. howitzers.

Poland has a 75-mm. section in each regiment.

Switzerland has just adopted a 47-mm. gun.

Belgium is testing a 47-mm. gun, reducible into eight loads and capable of being pulled by six men. A 47-mm. gun, mounted on armored Carden-Lloyd Mark VI tankette, has been adopted. This penetrates 40-mm. of armor at 600 yards.

It is universally recognized that the tactics and organization of infantry depend on its armament.

While realizing that infantry can never do without artillery—supreme offensive fire—every army wishes an infantry capable of exploiting to the maximum its own means of fire in order to permit and protect its movement.

To this end, almost everywhere, infantry fire-power has been increased, and an attempt is being made to use it to best advantage with a view to giving the foot troops close and continuous support up to the final assault.

Light and heavy automatic arms constitute the principal infantry armament in all countries.

The French rely upon the *fusil-mitrailleur* (machine rifle) for fire during movement. When the squad charges, the machine rifle is fired, if necessary, on the move.

Germany adopted the French organization two years ago. The "Zug" (platoon) has three similar groups, each having a light machine gun. German infantry still uses nine machine guns, Model 08/15, per company. However, in motorized units Model 13 has just been put in service. This is air-cooled, weighs about 20 pounds, uses 20-cartridge magazines, and has a rate of 600 rounds per minute. There are nine light automatics in the infantry company.

The old doctrine of separating fire and movement seems to persist in the German Army; the light machine gun team has four men, the rifle team eight. Thus, in exercises, the platoon leader is seen advancing in assault with his three rifle teams, while the light machine guns continue firing from their emplacements. At other times the light machine guns advance with the assault, keeping up a moving fire.

Having made the offensive the basis of their doctrine, the Germans desire a strong, spirited infantry, capable of acting without aid from the other arms. Seeking to impose their dominance over the adversary from the first contact, they demand rapid conception and execution of plans. That is explained in peace time by very objective instruction looking to developing the judgment and initiative of all leaders down to include the lowest; the instruction of squad leaders is very extensive and they are given delicate missions.

Italy, wishing to show her desire of retaining strong numerical power in the shock element, has long been faithful to the old German organization, with heterogeneous platoons of three rifle groups and one or two of light machine-gun groups. The adoption of the new light machine rifle, Breda 29, brought about the reorganization of the platoon, which now comprises three similar squads of about 15 men each—5 men with an automatic, 5 with a "trombocino" (a small trench mortar), 5 men with rifles. Fire-power is augmented without disturbing the force of shock, which is so highly lauded in Italy; there are nine automatics in the company but the number of men has not changed. The difference is that fire and movement are now incorporated into the squad.

The Italian high command continues faithful to its belief in the individual weapon as against the team weapon. If infantry fire-power must be increased, the solution will be sought in the improvement of the individual arm, substituting partly, no doubt, an automatic rifle. The Italian doctrine is highly offensive and the infantry, in its exercises, shows a veritable scorn of enemy fire.

The Japanese still keep an infantry platoon having two squads of fusiliers and four of voltigeurs (two heavy and four light squads). They are the most poorly equipped of all armies in light automatic weapons. In the attack the two heavy squads (fusiliers) protect the movement of the light infantry squads (voltigeurs). The latter charge when they arrive within 100 yards of the enemy. Supports and reserves close the line of riflemen to give it greater strength.

Japanese infantry of exalted patriotism has a determinedly offensive doctrine. It fights on its own account without liaison with the other arms, having neither wireless telephone nor wireless telegraph. It believes itself capable, thanks to its

moral superiority over other armies, of defeating all its adversaries, whatever their valor.

To compensate for its relative weakness in armament, the Japanese infantry gives great importance to night actions. There are two exercises per week, on the average, in every regiment.

The British hesitate. After having a platoon organization of three rifle squads and one of two light machine guns, they abandoned it to try three identical squads, each having a light machine gun. This is now used in the experimental brigade, though at present the regular platoon has two rifle squads and two Lewis gun squads.

Although preparation for a European war worries England less than the maintenance of its colonial prestige, the new infantry regulations mark a distinct advance over the former. The excessively large part devoted to ceremonials has been reduced in favor of combat instruction. The English wish to make their foot soldier "a formidable fighting machine."

Rumania, Poland, and Belgium have combat groups similar to the French organization.

The Belgian infantry has a platoon of four combat groups, each having a team of machine riflemen and a team of grenadier riflemen—15 men. The company has three platoons and thus contains 12 machine rifles.

For several years the machine rifle, or light machine gun, has become a strong and accurate and fairly stable weapon, thanks to bipods or tripods used with it. Since it compares well with the machine gun at ranges under 1200 yards, the characteristics of the machine gun are being exploited to the maximum and this gun is given the mission of supporting the firing echelon and of taking over the fire missions at long and extra-long ranges. The light and heavy weapons can be specialized into distinct missions.

The mission of supporting the firing echelon by machine guns can be carried out by either having them fire over the troops or through intervals, or else pushing them up on the line of riflemen.

From this we get the centralization within the battalion echelon, oftentimes going to the extremity of giving machine rifles all fire missions up to 1200 yards, and giving machine-gun companies artillery methods for carrying out long range fire, indirect fire, overhead fire, etc.

The other alternative is to decentralize toward the rifle company echelon, at times going as far as assigning heavy machine guns organically to rifle companies.

Light machine guns have become as accurate as machine guns at short and medium ranges. Their juxtaposition in the front line is therefore no longer necessary. Hence, advantage must be taken of the precision of the light weapons in order to utilize to the maximum the long range of the heavy weapons. These have a high moral and material effect up to the longest ranges, and grouping them permits considerable mass effects; the ease of shifting fire favors these concentrations. In mobile warfare, artillery will not have available sufficient reserve supplies of ammunition; therefore the foot troops must cover this lack of support by making the most of their own matériel.

The partisans of decentralization disagree with the divorce of machine gunners and riflemen. They doubt the possibility of firing over or between front-line troops in mobile warfare, and claim that for effectiveness, new barrels and ammunition in such quantity will be needed that the price will exceed artillery fire of equal effectiveness. Moreover, the safety zone of the fire of flat trajectory weapons is greater than that of artillery fire; it varies from 600 to 1800 yards. Therefore, no usable fire is obtained, only a sort of protecting fire, and, since all foot troops seek covered terrain where long distance fires have little use, it would be dangerous to base tactics on this doctrine.

In Germany the machine-gun company is considered as the means of action of the battalion commander during combat. But since the infantry must be able to insure fire superiority over the adversary from the first moments of combat, we can be assured that every means of fire will be put into action with the greatest intensity in the minimum of time. The machine guns must be ready to intervene with the maximum of power and speed. If they have to be pushed forward, they will go, and platoons will be allotted to front-line companies. If they can act under the orders of their own chief they will remain there. The Germans hold that war is a series of special cases, each of which requires a particular solution.

The German method of machine gun employment is based on:

Boldness in use

Extreme technical ability of leaders and troops

The versatility of the leaders, which enables them to adapt themselves to every situation and to find the appropriate combat procedure.

The general rule is an independent engagement of the platoons receiving a mission from their commander.

The latest directives for the technique of the conduct of machine guns dwells largely on masked fire, overhead fire, long-range fire, and on the training of leaders to take command unexpectedly of several platoons or companies to carry out massed fire. Units are taught to change from simple fires to the most delicate fires.

Furthermore, the question of distant fires by heavy machine guns have stirred up lively controversies in Germany, which the adoption of the Model 13 machine gun has only revived. Extreme theories have found many convinced partisans.

Some believe that the Model 13 machine gun should form the backbone of the position, freeing the heavy guns for distant fire missions for which their stability and precision fit them.

Others are of the opinion that the heavy gun, because of its weight, holds the defender to the ground and should continue to be the backbone of the principal barrage—distant fires being only an accessory mission. In support of this theory they add that in mobile warfare the attempt to slow up the enemy at a distance will prevent stopping him at short range because of ammunition shortage.

To avoid this difficulty, the following arrangements were made during a regimental exercise on a temporary position for the expenditure of ammunition:

- 10% for objectives beyond 2000 yards
- 40% for objectives between 800 and 2000 yards
- 50% for the principal barrage fire.

This is only a special case but is a simple procedure, which indicates the relative importance attributed by the regimental commander to the fires at different distances.

Finally, we should notice that the search for mobility and immediate intervention of heavy machine guns has led the Germans for a long time to provide important observation, communication, and goniometric instruments for the command groups of the company and platoons, and to mount or transport one of the platoons—the so-called accompanying platoon.

The Italians, required to fight in the mountains, try to develop instruction in special machine-gun fires. But their greatest interest seems to be in weapons with curved trajectories.

The English reserve their infantry for covered terrain and the problems agitating other countries seem not to bother them. In combat, heavy machine guns are distributed among the rifle companies. During their experiments they have created a machine-gun platoon carried on armored Carden Lloyds (2-ton track-laying tankettes)—somewhat like the German motorized accompanying platoon—with the object of pushing forward a few guns. This trial seems not to have had consequences thus far.

In Belgium, it is considered normal for the battalion commander not to hold his machine-gun company together. Rather, a platoon is given to each front-line company, retaining as a reserve of fire only what remains of the machine-gun company and the accompanying guns (mortars, howitzers). The machine-gun company has three platoons of four guns each. Besides this there is one division machine-gun company.

Japan, Rumania, and Sweden decentralize their heavy machine guns.

Sweden has decided two things, in view of its wooded and broken terrain:

- (1) From the time combat becomes imminent, machine gun and auxiliary weapons are given to rifle companies and made subordinate to them.

- (2) The composition of the infantry battalion will be changed during the next few years to have a staff, three four-platoon rifle companies, one three-platoon machine-gun company, one three-section platoon of accompanying weapons.

This tendency to employ heavy machine guns on supporting missions for the firing echelon and on distant missions has led several armies to seek a greater range and accuracy for these guns by adopting heavy bullets with improved profile and corresponding increase in powder charge.

The British have adopted a light machine gun (Bren) which replaces the Lewis gun and may even replace the Vickers gun of the battalions. It weighs about twenty pounds, can be fired from the shoulder or from a bipod weighing three pounds or from a tripod weighing twenty-eight pounds for indirect and long-distance fire. The British are trying to

simplify the task of small units, and if this one arm can replace two, it is a step in the desired direction.

The Danes go even farther in the suppression of heavy machine guns with their Madsen machine rifle, which, on a light base, gives results comparable to those of a machine gun. It connects power with mobility and can be used as a portable or stable weapon. Thus it would be possible to suppress the heavy machine gun and look to a battalion of four identical companies which could, according to circumstances, act as an ordinary infantry company or as a machine-gun company, depending on whether the machine rifles were used without or with their mountings. The units of the leading echelon stopped by hostile fire, or in possession of the assigned objective, could form the base of fire for the following echelons.

This idea seems to gain ground. Czechoslovakia and Belgium are trying a light tripod for their machine rifle; Switzerland uses the Madsen tripod.

The machine rifle, and light and heavy machine guns are all flat-trajectory weapons, capable of only partially neutralizing prone or intrenched personnel. Liaison between infantry and artillery may fall down; the action of artillery may be delayed and may even be impossible. All these circumstances militate in favor of a curved-trajectory weapon for the infantryman.

This need has been recognized everywhere and all infantries have been provided with some form of mortar, but in small amounts except in Germany.

The difficulty of transporting ammunition for these weapons has been the hindrance to increasing their number. There is no point to having the weapons if they cannot be fed. The adoption of vehicles like the Carden Lloyd (tankette) will certainly be followed everywhere by an increase in the number of these weapons.

Brandt mortars are most favored and are in use or being tested in France, Italy, Poland, Sweden, Yugoslavia, and Switzerland.

The Germans have not waited for improvement in transport to equip their infantry with plenty of minenwerfers. The proportion of these arms has always been great and they are especially powerful. They are in the regimental echelon, which is appropriate since the new minenwerfer of 75-mm. caliber has a range of 3,800 yards. By varying the powder charge it will give a flat or curved trajectory. It is light, tactically

mobile, low, and well suited to mobile actions and the role of accompanying gun. The accompanying gun has been replaced in maneuvers by an antitank gun.

A 105-mm. mortar is under trial; its range will be from 3,800 to 4,350 yards.

In other armies we find mortars in the regimental, battalion, and company echelons. When centralized in the regiment they are divided between the battalions in combat, where their range of 1,600 to 2,200 yards is suitable. Being grouped in a regimental company—aside from instructional facilities—permits the regimental commander to make an allotment adapted to his maneuver. It seems that the battalion is the most suitable place for them, although both echelons are possible.

The English have a platoon of two mortars in their new support company. This 95-mm. mortar fires a 10-pound bomb 1500 yards.

Certain nations, however, like Sweden, equip both the battalions and the companies with mortars. The Swedish battalion has two Brandt mortars and the company, in its heavy platoon, has two machine guns and two Brandts, which puts a total of eight mortars in the battalion.

Poland has a group of two Brandts in each battalion and three "Granatniks" (light mortar) in each rifle company.

The Italian battalion has no mortar at present. A company bomb-thrower and another one for the battalion are under test. There is even talk of a howitzer for the regiment or battalion.

Belgium is testing a D.B.T. grenade thrower (Denis, Bernard, Troisfontaines) that will shoot a fragmentation or smoke shell 800 yards. The mortar weighs 17 pounds and fires 30 grenades in 10 minutes. It is probable that the company will use this weapon because the battalion already has 76-mm. mortars and 47-mm. cannons.

The 76-mm. mortar (F.R.C.) has a range of 2400 yards, weighs 560 pounds, and uses a shell weighing 10 pounds with $1\frac{1}{4}$ pounds of explosive.

For small caliber, curved-trajectory fire, all armies retain the rifle grenade. Quantities vary; Italy has the best proportion with 45 tromblons per company and 500 projectiles immediately available. Poland has one "Granatnik" group

per platoon equipped with a weapon firing a 1½-pound projectile from 300 to 800 yards.

Everywhere, infantry is better equipped for the defensive than for the offensive on account of its armament.

If it is still in a period of research for suitable weapons against mechanized matériel, it is far better disposed against exposed personnel; rifles, automatic arms, curved trajectory weapons, and barbed wire retain their value.

The principles and the general methods are about the same everywhere. Methods of execution differ somewhat, such as those of Germany and of Japan.

The Germans endeavor to scatter their carefully camouflaged arms in width and depth in order to keep the assailant in doubt as to the trace and occupation of the position. Other means for deceiving the enemy are: seeking to obtain maximum flanking fire; the creation of false organizations, covered by flanking fire; changing of emplacements; and advanced lines. The counterattack is especially important with them on the defensive, and reserves are provided to this end down to the platoon echelon.

Against aircraft, infantry lacks, generally speaking, special matériel. Reliance is placed on existing arms with special methods of using them on this particular mission and with directions in regulations that are often awkward.

The poorly equipped rifleman has a tendency to neglect this question. However, the danger is more and more grave, not so much for troops in the front line, but for columns on the march.

Everywhere a search is made for a suitable weapon, generally toward a machine gun between 47-mm. and 55-mm. caliber.

In conclusion, the following points relative to foreign infantry development are outstanding:

- (1) Orientation toward mobile warfare and offensive doctrines, which are often pushed to the extreme.

- (2) Infantry remains the principal arm.

- (3) Importance of experiments and studies made to render it more mobile.

- (4) Tendency toward increasing and perfecting its armament, in order to facilitate the accomplishment of its mission under all circumstances.

(5) Necessity for infantry to utilize to the maximum its means of fire, carrying with it a deeper knowledge of the technique of weapons and methods to be used.

There is no way of comparing the infantry of different armies; each has its special qualifications and features of excellence.

VIEWS OF A BATTALION COMMANDER ON INFANTRY-ARTILLERY LIAISON

["Réflexions d'un commandant de groupe sur la liaison infanterie-artillerie," by Major Devinek. *Revue d'Artillerie*, February 1936]

Abstracted by Captain F.J. Tate, Field Artillery

I

Liaison between the infantry and artillery remains a matter of deep concern. This is due mainly to our apparent inability to arrive at a satisfactory solution of the problem. It is hoped that the search for this solution will not be in vain, so long as men and matériel have not reached perfection.

In recent articles appearing in the *Revue d'Infanterie* and *Revue d'Artillerie*, ingenious new methods have been brought to light. These are made possible by developments in matériel and progress in technique. Undoubtedly, these developments will have a direct influence on the effectiveness of liaison.

The objective of this study is limited. We hope to present what is believed to be a satisfactory solution of infantry-artillery liaison in the case of a 75-mm. battalion forming a groupment in direct support of an infantry regiment, by taking as a basis the liaison facilities at present available to the 75-mm. battalion.

In certain respects, this should be a practical study, supplemented by certain conclusions and recommendations emanating from the ideas presented. To a lesser degree, we believe, it should offer one solution to this problem, which is important, if not vital, to combat.

II

The *Instruction provisoire sur la Liaison et les Transmissions* (Annex 2) defines infantry-artillery liaison and its method of employment as follows:

Article 10.—Infantry-artillery liaison is the adaptation of the fires of the artillery to the needs of the infantry unit which the artillery supports.

Article 11.—Whatever its goal might be, in all cases it is essential:

(a) That the supported infantry commander be able to convey the infantry situation and the needs of his command to the commander of the artillery in direct support.

(b) That the artillery commander, either on his own initiative or on request from the supported infantry commander, be able to direct fire of sufficient effectiveness on targets which threaten the maneuver of the supported infantry.

Article 12.—In principle, it is the function of the artillery to provoke conditions which will facilitate the employment of all or any part of the infantry.

Article 13.—Infantry-artillery liaison is facilitated:

(a) By establishing the command posts of the supported infantry commander and the supporting artillery commander in close proximity to each other.

(b) By frequent visits to the supported infantry commander by the artillery commander and his staff.

(c) By the use of liaison detachments.

In addition, terrestrial and aerial observation offer many opportunities to supplement the methods of liaison listed above. These should be exploited.

III

It is regrettable that our regulations give little consideration to the role of observation, be it terrestrial or aerial, as an asset to liaison. In many cases, the disappointments ascribed to infantry-artillery liaison, and the lack of confidence which inspires these disappointments, among certain people, are due to an improperly exploited artillery observation system which, while it should, above all, devote its attention to fires in direct support, is often insufficiently adapted to the installation of the infantry.

But, in referring to certain texts, we find that the artillery in direct support is but a fraction which is usually subordinated to the infantry for combat.

There is no disagreement on this point. Artillery in direct support has a definite obligation to employ all its means in support of the infantry, and this employment will render maximum effect only if the artillery is properly disposed with respect to the infantry disposition and its mission, while maintaining reliable and rapid liaison with the higher and lower echelons of the infantry.

This employment requires not only that the flow of liaison down to include the lower units should be uninterrupted (this is often unattainable in the case of liaison detachments) but also that, regardless of the echelon involved (regiment or battalion) it should be constantly capable of functioning with all the promptness and effectiveness required by the situation.

An *artillery observation system*, "adapted to and in liaison with" the infantry battalions, manned by artillery observers capable of quickly locating the targets and of adjusting artillery fire on these targets, equipped with means of communication which are rapid, durable, effective, independent, provide the only effective means of fulfilling the requirements of liaison.

What are the reasons for the ineffectiveness of liaison? Under what circumstances will difficulties in liaison arise?

The reasons certainly can not be found within the echelon of the infantry regiment because, within this echelon, sufficient delay usually elapses between the hour the infantry colonel reaches his decision and the hour set for the execution of his plans.

Most difficulties in liaison appear within the battalion echelon, because the actions of this echelon cannot be sufficiently anticipated; its operations depend largely on the opportunities resulting from combat. The conception "intervention delay" becomes vital, in the support of a counterattack, "immediate thus local" as well as in the exploitation of an unanticipated success, or in the more frequent situations, such as neutralization of a hostile weapon, a tank, or a locality which threatens to disrupt the maneuver of the battalion or which is inflicting casualties in its ranks. In the latter case, the morale of the infantry is subject to a severe test; minutes seem like hours. Real liaison consists in reducing to the minimum the duration of this delay in delivery of artillery fire.

In such cases, the artillery in direct support is not justified in delaying even momentarily.

Furthermore, information transmitted to the rear is of comparatively little value, if the artillery is unable to exploit it almost instantly.

The battalion liaison sergeant and his liaison section, unassisted, are incapable of fulfilling this heavy task. They should be supplemented by a qualified artillery observer who should be able to employ directly either his battery or the whole battalion. This observer falls short of fully accomplish-

ing his mission if he fails to maintain constant liaison with the supported battalion commander. This liaison permits the observer to inform the infantry commander of targets he observes; it facilitates the designation of targets by the infantry commander; and also places the artillery constantly in a position to fulfill the demands of the infantry.

IV

An examination of regulations reveals that the following procedures are prescribed to facilitate infantry-artillery liaison:

(1) *Juxtaposition of command posts.*—Without doubt, this procedure has many advantages, and yet we find that it is usually rejected whenever its employment presents difficulties in the exercise of command.

These difficulties might arise from the following conditions:

The increased vulnerability of certain areas due to congestion resulting from the assembly of troops and material in these areas.

Difficulties in radio, telephone, and telegraphic transmission, especially in congested areas.

An objection might be raised to this procedure of installing the command post in proximity to the infantry command post on the ground that it is more advantageous and more normal to assemble the major portion of the headquarters personnel and battalion communication equipment in the vicinity of the batteries. This point has its merits, since it is indispensable that the battalion executive be in the vicinity of the batteries. The many advantages accruing from the new functions of the battalion executive in the maneuver of the battalion are practically nullified by this method (juxtaposition of command posts).

(2) *Personal contacts.*—It is believed that the continuous presence of a liaison officer with the infantry commander, normally, will be sufficient. This does not mean that the battalion commander (or his representative, the battalion executive) will refrain from all contact with the infantry commander when the command posts of the artillery and infantry are separated. On the contrary, these visits should become more frequent on the approach of a crisis, or as changes in the situation become more frequent. In reality, the course of events regulates these personal contacts.

(3) *Liaison detachments*.—In view of its composition, its limited facilities, and time limitations, the liaison detachment, on which we are prone to rely in large measure for infantry-artillery liaison, is incapable of effectively fulfilling all the needs of liaison.

The primary role of the liaison detachment is to exploit the possibilities of artillery fire, to transmit to the artillery the requests of the infantry, and to inform the artillery of the infantry situation. In other words, the personnel of this detachment fulfills a double mission: that of technical adviser and that of conveyor of information which, even in the most urgent cases, is generally dilatory. For example, a battalion commander will request artillery fire on a target (a point or area) which he has located. This might be a target which is of immediate danger, either because of its actions or presence—a target which is under full view and reported more or less approximately on the 1:50,000 map, or in rare cases (we wish this were possible more frequently) on the 1:20,000 firing chart. A sergeant is entrusted with the exploitation of this information.

If this noncommissioned officer is alert, he will realize that his best course is to contact the nearest artillery observer, to whom he will designate the target with the necessary details. Having contacted this observer, he will transmit the information by whatever means are available (information which becomes almost useless after appreciable delay) to the artillery observer in the following form:

"Infantry reports (such and such) target in (such and such) area; can you see the target . . . are you able to observe and adjust fire on this target . . . where is our own infantry?"

First of all, can we be assured that the information will be received accurately and in an exploitable form? Frequently the text of messages are gradually modified during the course of transmission, or are so poorly drafted originally as to be useless to the artillery.

Consequently, much valuable time is lost. Experience has shown that the influence of this impracticable procedure affects all elements from the infantry regiment down to and including the batteries.

What are the primary interests of the infantry regimental and artillery battalion commanders? Are they interested mainly in receiving information that a nest of machine guns is in action, holding up the advance . . . or are they interested

more in learning that these automatic weapons, reported by thenth infantry battalion, have been taken under fire by batteries, controlled from an observation post?

Consider this question. Its answer is the solution to this problem.

V

Actually, urgent requests for artillery fire, emanating from infantry battalion commanders, will seldom reach the executants (generally these will relay the calls to their observers) of fire too late for the timely delivery of the fire missions, since the artillery commander keeps in touch constantly with his liaison detachment.

However, these delays in transmission, even when a wide margin of safety has been allowed, are often underestimated by the infantry as well as the artillery.

We should also bear in mind the fact that artillery, like all other weapons, should fire only on definite targets, localities or areas definitely delimited. Unless this practice is followed, the amount of ammunition expended will be considerably out of proportion with the capability of existing supply facilities, or with the number of pieces in action.

With reference to this subject it should be remembered that it is rather difficult to designate the location of a target accurately by hectometric coordinates.

Training, favorable terrain, good positions, and a preliminary terrain study are all essential.

It appears preferable to delegate the task of determining the location of the target to the artillery observer, who is located more suitably and better equipped than the infantry for the accomplishment of this task. The infantry, in direct contact with the enemy, is poorly situated to accomplish the task. It must be understood that these are targets of opportunity, and are among the most dangerous, because, at the time, they are not being subjected to fire, and therefore should be located and taken under artillery fire as soon as possible.

To sum up, normally, most of the difficulties of infantry-artillery liaison in combat will be encountered in the battalion echelon.

The solution of this problem by this echelon might be found in the constant presence of an experienced officer in its near vicinity to act as an observer, and often to conduct fire. He should be an expert in the conduct of fire because the fires

he is required to conduct are among the most difficult. These fires are directed on targets located by the artillery observer and also on targets designated by the infantry—by adjustment on the target itself, whence result the double advantage of economy in ammunition and effectiveness of fires.

Consequently, the time factor, reliable method of transmission, without intermediaries between the observer and the guns, messages drafted in the language of the artillery, where indecision and time are reduced to the minimum, very often result in the elimination of the difficulty in designating the target and also the difficulty in accurately locating the friendly infantry.

This artillery language should be employed in every possible case, in the appropriate form. The form is simple, direct, totally devoid of ambiguity, and above all, rapid.

This decentralization of fires in direct support in no way implies a usurpation of the prerogatives of the infantry colonel. He retains all his usual functions, and is in position to bring about the intervention of the artillery of direct support whenever he deems necessary by causing the liaison detachment to act. It does not in any way diminish the role of the artillery battalion commander who should always remain master of his fires. Local incidents, which can not be anticipated, and are only a minor part in the course of the whole action, can be taken care of more thoroughly and more quickly by this method, especially since the infantry battalion commander normally lacks suitable means of communications for the accomplishment of this task.

This decentralization requires initiative on the part of the artillery observers (usually the battery commanders and lieutenants who are experienced in the conduct of fire), who are always in close liaison with the infantry battalion commander. It adds greatly to the flexibility of conduct of fire, and is excellently adopted to combat where the situation is either indefinite or changes rapidly. It is expedient and provides flexibility of fire, whose role is sure to increase in conformity with the evolution in armaments whose mobility is increasing daily, thereby resulting in the necessity for greater rapidity in the delivery of fire.

VI

The artillery officer should seek to the limit of his ability and material means, to attain his objective as defined in regulations, namely:

To respond to the needs of the infantry commander.

To act on his own initiative or on request of the supported infantry commander against targets which oppose the maneuver of the infantry.

This necessitates supplementing, in a practical way, the deficiencies of observation enumerated above in regulations. While regulations place (permanent) terrestrial observation and (intermittent) aerial observation on the same level in valuing their capabilities of contributing to the effectiveness of infantry-artillery liaison, undoubtedly the ground observer plays a preponderant role in the accomplishment of this liaison.

Consequently the observation system of the artillery in direct support should be organized and developed with a view to participating continuously in the infantry-artillery liaison. The deployment of this artillery should be such that it can fulfill all the requirements incumbent upon it, while remaining adapted to and in liaison with the supported infantry.

The liaison detachment should retain its present role; that is, of technical adviser and receiver and transmitter of data.

The demands of the infantry colonel, since they generally consist of "pre-arranged fires" delivered at a fixed time, are transmitted by the liaison officer, always after contacting the artillery battalion commander or his executive, if the mission is sufficiently important.

As to the demands of the front-line infantry, which are generally so urgent as to require immediate attention, they will be handled by the *artillery observer*, utilizing, if such be the case, information furnished by the infantry battalion commander, which he has received from his (infantry) observer, in case the artillery and infantry observation posts are separated.

In case these observation posts are not located together, necessarily, telephone liaison is established between them through the battalion central, thus providing the considerable advantage of two closely linked communication nets: that of the infantry, and that of the artillery observers who are connected directly with the artillery battalion and with the batteries.

Finally, the close proximity of an artillery officer (who observes and conducts fire) to the infantry commander, in liaison with each other, certainly should develop closer team-play in many situations.

The personal contacts of the artillery commander with the infantry commander and the continuous presence of an artillery officer with the infantry commander, provide very necessary liaison with the *higher* supported echelon. Within the *lower* units, liaison is maintained: (a) partly, by the assistance of the artillery officers (observers and conductors of fire), connected in one way or another with each front-line battalion, and linked directly with their respective battalions; and (b) partly by the presence of the liaison sergeant and a portion of his liaison detachment in close proximity to the commander of battalions; (c) by a separate transmission system for artillery observers employing radio telephone. While less suitable, perhaps, than telephone, radio is more quickly established and in all cases, superior to the radio-telegraphy, the type employed by the infantry; (d) by the infantry net, which is employed by the artillery observer when his own facilities fail, finally, by employing the means available to the liaison detachments.

VII

It remains to be seen if the facilities available to the artillery battalion are sufficient to provide for the requirements of the plan we have outlined.

From the viewpoint of observation, there is no difficulty. The artillery battalion has four observation sets (one for the battalion staff with a lieutenant observer, and one per battery with a sergeant and two men, the battery sets being normally reinforced by the battery commander or a lieutenant who is a gunnery expert).

You will observe that, in the case of the 75-mm. battalion in direct support, it is possible to install two groups of observation posts:

A direct support or advance group, equalling in number the battalions in front line.

A general support or rear group employed for general surveillance and to supplement the forward group.

The first group is connected initially by radio-telephone, because, generally, they are distantly removed, and the time

factor in providing liaison is of primary importance. As soon as practicable they are connected by telephone.

Generally, telephonic liaison will be the rule for the rear group of observation posts.

The telephone equipment available to the 75-mm. battalion will generally be sufficient for these requirements, which include the interior communications of the battalion and the wire line between the battalion and the infantry colonel, providing that a third net for the liaison detachment is not established.

The means for radio communication only, are insufficient.*

An increase of one set, making a total of three, would be sufficient for most situations. In the normal case of a regiment with two battalions in line, we would thus have a triangular radio-telephone net (two with the observers and one at the command post). This set-up should be effective, even in critical periods.

It is feared that a net consisting of four such sets might burden the radio-telephone system. However, an allotment of four sets might be operated without additional burden to the battalion staff by supplanting the R11 set, normally employed to listen-in on the infantry net. The usefulness of this set should diminish considerably, in view of this new liaison system.

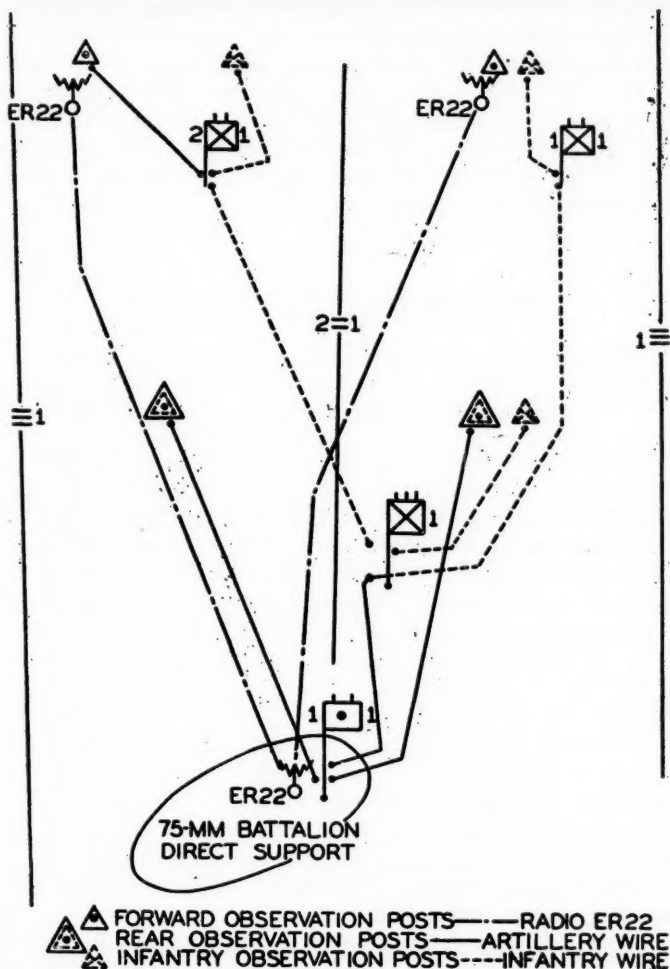
The facilities for transport of radio-telephone equipment and the personnel destined to use this equipment should be modernized. The model 1888 cart, used at present in the horse-drawn artillery, is too cumbersome, lacks the necessary flexibility in certain terrain, and is generally ill-adapted in numerous situations.

This study, or more correctly, this discussion, is based on the 75-mm. battalion in direct support.

When the groupment in direct support consists of two or three light battalions, the employment of the groupment is simplified by the abundance of communication facilities available in the groupment. Certain details, such as the juxtaposition of command posts, might appear different; however, the artillery observers should remain closely linked with the front-line infantry battalions.

*The 75-mm. battalion, at present, is equipped with two radio-telephones (ER 22). These undoubtedly have brought about an appreciable change in the possibilities for communications and consequently in the maneuver possibilities of the battalion, especially in unstabilized situations.

One might raise the question that, in such cases, a subdivision and allotment of the artillery battalions to the infantry battalions might result. However, the procedure prescribed in



training regulations states that the commander of the groupment in direct support, in the offensive, generally subdivides his zone among his battalions, and in defensive situations, might subdivide the assigned zones among his battalions.

Whatever the situation might be, this artillery is not frittered away; it retains all the flexibility of its guns for any possible concentration in the zone of the supported infantry regiment, or for missions which may develop, pursuant to orders of higher authority.

We feel convinced that the close adaptation of all or part of the observation system of the artillery in direct support to the infantry plan, by the application of the methods enumerated above, though not a complete solution of our problem, should result in definite and effective modifications in the problem of infantry-artillery liaison.

**THE CAUSE, PROGRESS AND LESSONS
OF THE CHACO WAR, 1932-1935**

[“Über Entstehung, Verlauf und Lehren des Chaco-Krieges 1932-1935,” by W. Faupel. *Wissen und Wehr*, January 1936]

Abstracted by Major G.J. Braun, Infantry

The causes of the numerous boundary disputes between the various South American countries date back to their liberation from Spanish and Portuguese rule. The division of the South American continent and Central America into nineteen countries, most of whose terrain had never been explored, resulted in ill-defined boundaries. This was the case of the Chaco, a plateau country located between Bolivia and Paraguay. This territory contains oil wells on the Bolivian side, at the foot of the mountains. The terrain gradually slopes to the east and is partially covered by dense underbrush and forests which require machetes to cut paths through them, and partly consisted of vast grassy areas. Some of the terrain, due to the nature of the soil, does not permit the water to soak through, and becomes flooded during the rainy season. This soil, in turn, becomes pulverized to a heavy dust under motor or animal transportation. The entire region is subjected to intense heat most of the year.

The Bolivians had gradually moved eastward in search for more oil, whereas the Paraguayans moved westward into the Chaco to obtain timber and for cattle grazing. Gradually these groups approached each other, and in 1927 contact occurred. Small forts were erected in the disputed zone manned by small garrisons. To reach the Chaco from La Paz, the

principal city of Bolivia, required a six-day trip by train and truck transportation, whereas it required but a half-hour motor boat trip from Asuncion, Paraguay.

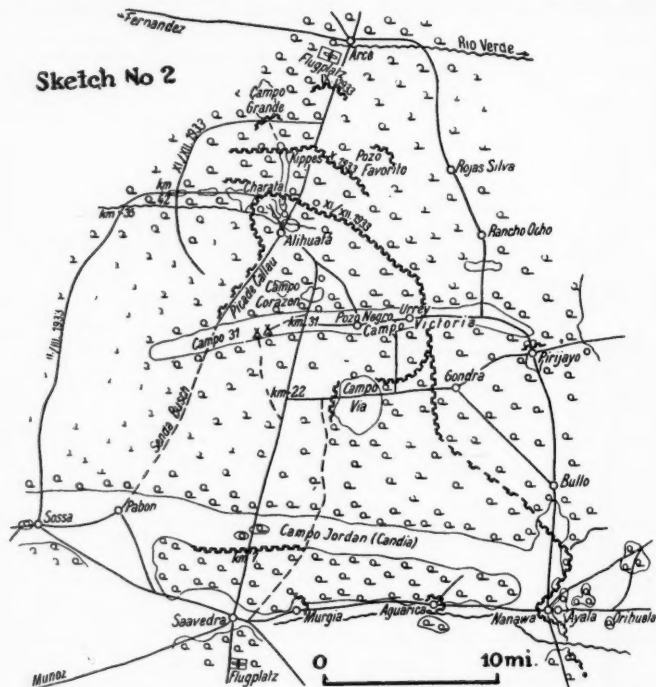
In 1932 the Bolivians occupied the apparently abandoned fortress of Pitiantuta. The Paraguayans considered this an attack, and a month later recaptured the fort which had been



renamed Santa Cruz by the Bolivians. This led to partial mobilization by the Bolivians, who intended to send a small expedition of retaliation, but made the grave error of using too few troops. Their force consisted of the Bolivian 4th Division, of 1100 men who had the task of protecting 310 miles of frontier (as the crow flies). This small force was

ordered by the government to start an offensive, and during 28-31 July it captured the forts Corrales, Toledo, and Bogueron.

On 9 September the Paraguayans launched an attack with superior numbers and enveloped and besieged Bogueron forcing the garrison to surrender after a 23-day siege. Lieutenant General Estigarribia, who at the outset of hostilities was a first lieutenant, proved an energetic leader of the poorly trained



Paraguayan Army. His favorite tactics of single and double envelopment, with the cutting of the Bolivian lines of communication, resulted in the capture of the fortresses of Yujra, Falcon, Arce, and Alihuata. The Bolivian forces were in full retreat and it was only with difficulty that their officers were able to stop it, and by frantic calls for reinforcements were able to assemble 3000 men for a counterattack. Both sides decided to dig in and the war reverted to position warfare.

On 3 December 1932, the Bolivians recalled General Kundt from forced exile to assume command of their forces.

He found the military headquarters at Villa Montes too far in rear of the theater of action and moved it to Munoz.

As the Paraguayan forces left the river and lumber railroads and penetrated into the Chaco, their supply service became more difficult, making it possible for the Bolivians to resume the offensive on 13 December, and by 20 December captured the fortresses of Platanillos, Loa, and Bolivar. Both armies now had about 200,000 men in the field. In the early part of January 1933, the Bolivians captured Forts Corrales and Mariscal Lopez, but a major attack on Nanawa resulted in very little success. They did succeed in capturing Alihuata from the Paraguayans about the middle of March. At this time the Bolivians were hampered by the Chilean and Argentinian arms and munitions embargo. On 4 July they again attacked Nanawa, using mines, tanks, and flame projectors, but were repulsed. Later on in the summer they captured Pirijayo and forced the evacuation of Campo Via.

Eventually the Paraguayans counterattacked and at Campo Grande, by an enveloping attack, cut off 850 men with 50 machine guns and forced their surrender by capturing their water supply. On 11 December they enveloped and forced the surrender of 6000 men with considerable war supplies (trucks, mortars, machine guns, etc.); 3000 men had succeeded in escaping the encircling movement. General Kundt was immediately relieved because of this disaster. The Bolivians retreated, abandoning many of their forts. At this point the Paraguayans, due to political pressure, offered the Bolivians an armistice which saved the latter from utter defeat. Up to that time the Bolivians had lost 5000 killed and 8000 captured, and the Paraguayans, 5000 killed and 100 captured.

The armistice ended 7 January 1934, having given the Bolivians a chance to reorganize and turn their flight into organized rear guard action. About the end of March the Paraguayans captured a Bolivian regiment of 600 men.

In the meantime, Bolivia had called 45,000 more men to the colors and was able to start a counteroffensive which resulted in the capture of 2000 Paraguayans with 100 machine guns at Canada Strongest. An attempted counterattack by the Paraguayans, who cut a 70-mile path through the dense forest, was detected by the Bolivian air forces and dispersed. Both sides again reverted to position warfare and a stalemate. The Bolivians were now forced to use their utmost efforts to

protect their oil wells, so vital to their transportation, from capture.

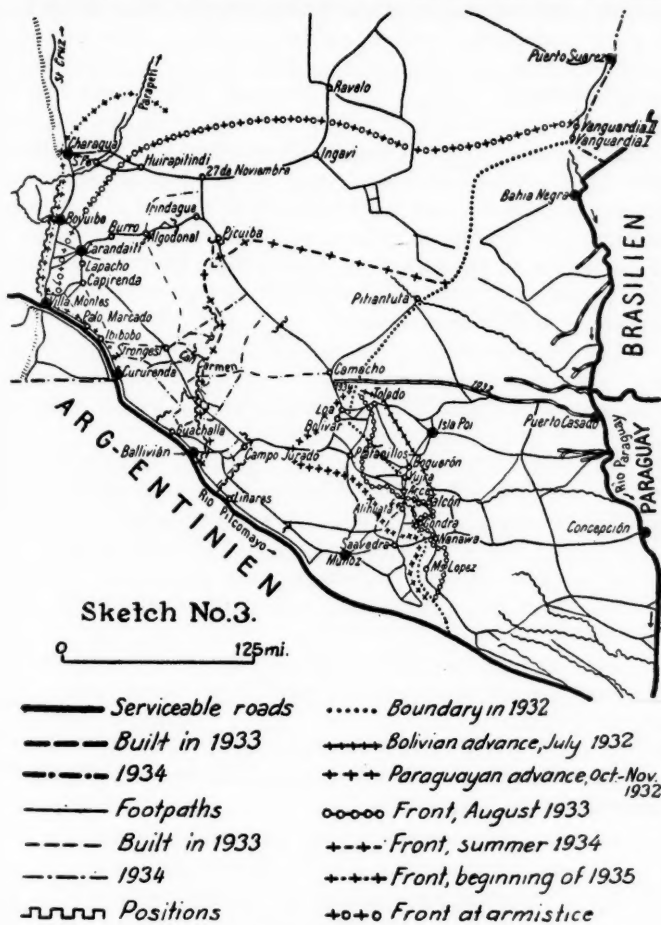
During 14 to 16 November the Paraguayans again enveloped a large Bolivian force and compelled the surrender of 7000 men. This caused the Bolivian president to relieve General Penaranda, the army commander, who in turn arrested the president upon his arrival at the front, forcing him to resign. The Bolivians then conscripted 120,000 men for field service, but before these forces arrived Guachalla had to be abandoned on 22 November. The year ended with Bolivia resorting to rear guard action and loss by capture of many men. They had retreated 120 miles but by so doing had come closer to their own supply base, whereas the Paraguayans were fatigued by their efforts and had over-extended lines of communication. The Paraguayans, enthused by their success, made a 35-mile forced march and captured the springs at Irindague, thereby forcing the Bolivians at Picuiba to evacuate. They then captured Santa Fe and Caradaiti which gave them the control of the enemy lateral road net, enabling them to capture Boyuibe. This severed the Bolivian lines of communication, divided their forces, and seriously threatened their oil fields.

The hilly terrain favored the Bolivians who now could use their artillery advantageously. Reinforcements and supplies were now arriving in a steady flow. The Paraguayans found that their surprise enveloping tactics were impossible in this terrain, and their frontal attacks were mostly unsuccessful due to lack of cover, although they did occupy Charagua in Santa Cruz Province on 16 April 1935.

The Bolivian counteroffensive started on a large scale and the reinforced army recaptured most of the vital locations but were unable to exploit their successes due to the lack of mobility of their green troops. On 14 June 1935 an armistice was signed and the war ended.

At the outset of the war in the Chaco, the Bolivians had possessed an excellent but small elite army trained by German officers. The Paraguayan Army had been partially trained by French officers and Argentine officers, but lacking finances, it was not comparable to that of the Bolivians. At the outset of the war the Bolivians made the error of only partially mobilizing. This doomed their forces to defeat since the Paraguayans, with their shorter and better lines of communication, were able to quickly send superior numbers against them. The ter-

rain, with its hot and densely wooded lowlands, favored the Paraguayans, who were acclimated to it, but hindered the Bolivians, who were accustomed to high altitude and sparsely



covered terrain. In the Chaco their field artillery was practically useless, due to lack of observation, and their keen vision to no avail because usually the first warning came from close range from the snapping of a branch of the underbrush. Men were easily lost and died of thirst. The Chaco meant much to the Paraguayans who used it for grazing and lumber

projects, but to the Bolivians it was a distant and unknown territory.

The fighting in this forest country favorably demonstrated the use of the sub-machine gun which afforded great fire-power in a 360° arc in the event of sudden surprises. The light air-cooled machine gun provided the brunt of the fire-power, there being one machine gun per 6 to 10 men. The Brandt Stokes Mortar, because of its light weight and high angle fire, was also in great demand. Due to lack of observation and communication, little artillery was used, and it was impossible to use indirect or cross fire with machine guns on account of the dense underbrush. Frontal attacks were often resorted to because of the ability to come to close range before heavy losses were experienced, but most of the greater successes were due to enveloping movements.

The tanks were of little use to the Bolivians but could have been of great service to the Paraguayans in their pursuit, when near the mountain frontier, against the hostile machine guns which caused them such heavy casualties.

Although both sides had some air service, they engaged in but few air fights but utilized their air service for observation, mapping, transportation of supplies and wounded.

Only by motor transportation was it possible to keep the troops supplied with water, rations, and munitions. Despite the bad roads, these trucks were able to travel 95 to 125 miles per day.

Even though the armies were comparatively small, since the terrain could not accommodate larger forces, there was intense fighting throughout the war. The Paraguayans lost 30,000 men killed, which, considering their population of 1,000,000, is equal in proportion to the losses suffered by Germany in the World War.

CAVALRY COMBAT AT GORODOK

(17 August, 1914)

["Un combat de cavalerie: Gorodok (17 aout 1914)," by General Inostransev, Russian Army. *Revue de Cavalerie*, November-December 1935]

Abstracted by Major F. During, Infantry

On 27 July 1914, the Russian 2d Cavalry Division, commanded by General Gigaline, was under orders to move to the

Austro-Russian frontier. It had the mission to cover the mobilization, and then the concentration in Podolia along the line: Nikolaiev—Tcherniostrov—Iarmalinci—Dovaievci, of the Russian Eighth Army under General Broussilov. (See Sketch No. 1.)



The 2d Cavalry Division was composed of:

One brigade of Don Cossacks: the 16th and 17th Regiments

One mixed brigade of Cossacks: the 1st Regiment of Kouban Regulars and the 1st Terek Regiment (Volgski)

A detachment of 8 machine guns

Two batteries of Cossack horse artillery

Comprising a total of 24 troops (Sotnias), 8 machine guns and 12 cannons.

The front assigned to the division extended from Santanov to Skala (measuring more than 24 miles) along the Zbrovitch River which formed the frontier. The 12th Cavalry Division extended the line to the north of the 2d Cavalry Division, while between Skala and the Dniester River there were only the groups of frontier guards.

The 2d Cavalry Division was disposed along two lines:
In the first line were the 1st Kouban Regiment at Lisovody,
and the 1st Terek Regiment on the outskirts of Koupine.

The brigade of the Don was in reserve near Gorodok.

Several troops were on outposts with patrols along the Zbroutch River.

Information concerning the enemy was very indefinite. Every effort of the Cossacks to cross the river failed under fire of a vigilant Austrian infantry. A few prisoners who were taken declared that they belonged to the Landsturm and that they had behind them large units of cavalry.

The situation remained the same until the Russian Eighth Army, having finished its concentration, and intending to penetrate into Galicia, sent its cavalry to reconnoiter the region between the Zbroutch and Sereete Rivers.

On 14 August, General Gigaline recalled the 1st Terek Regiment from Koupine and moved his forces to the west, covering himself to the north by the Kouban Regiment left in place; two companies of the 60th Infantry covered the passage at Gorodok. On the morning of 15 August, the Russians occupied Ousiatyn, which the Austrians had evacuated during the night, retiring on Tchotkov. The advance guard of the 2d Cavalry Division organized the necessary bridgeheads to the west along the Zbroutch River and sent patrols toward Exertany, Proboutna, and Krogoulets to reconnoiter, but no enemy was met.

However, during the afternoon the commander of the 1st Kouban Regiment reported on his front a reinforcement of the enemy and increasing activity in the region of the Sereete River, and he had been obliged twice to reinforce troops on outpost duty.

General Gigaline decided that the enemy was marching on Gorodok and directed immediately that his division march in the direction of this locality.*

On the side of the Austro-Hungarians, the 5th Cavalry Division (General Frohreich) composed of the 11th and 23d Cavalry Brigades (1st, 6th, 7th, and 8th Honved Hussars) were assembled early in August in the region of Tarnopol—Trembovlia, with the mission to cover the line of the Sereete

*NOTE.—This precipitated decision and action was probably the reason for the relief of General Gigaline of his command by General Broussilov and his replacement on 16 August by General Pavlov, who commanded the Russians during the combat at Gorodok.

between Ostrov and Trembovia. On 14 August, the division having been reinforced by the 15th Cavalry Brigade (2d Dragoons and 11th Uhlans), received orders to march to the south of the line: Tarnopol—Proskourov along the axis: Satanov—Gorodok—Kapoigorod. To carry out this mission the mass of the division was moved to Kosina, preceded to the crossings at Satanov by the light elements, which, during 15 August made contact with the advance guards of the 1st Kouban Regiment.

Attempts were made by the Austrians in the morning and early afternoon of 16 August to cross the Zbroutch River in the face of adjusted fire from the Cossacks. Beginning at 5:00 PM, the Austro-Hungarian artillery entered into action, and the Russian troops engaged before Satanov broke off the combat and retired on Lisovsky.

In the meantime, a message from Kamenets Podolsk indicated that a division of Austrian cavalry had arrived in front of the sector held by the Russian frontier guards which indicated that the Austrians desired to start an offensive along the whole front.

The new commander of the 2d Cavalry Division, General Pavlov, estimated that he could better carry out his covering mission by taking a position near Gorodok, and, with his entire force united, giving battle to the enemy who was approaching from Tarnapol. By 10:00 PM, considerable reinforcements had joined him: a battalion of the 14th Rifle Regiment with 2 machine guns and 2 cannons, which the Eighth Army placed at his disposition and which came up in automobiles that he had requisitioned. These elements were detrucked at Gorodok, where they prepared the western part for defense.

The Austrian General Frohreich had issued his orders for the 17th as follows:

"The division will march tomorrow by Satanov on Gorodok and Kapoigorod.

"It will have: three squadrons as covering guard to gain contact with the enemy infantry.

"An advance guard (under command of General Bessingen-Ripenburg) composed of the 1st Honved, a group (3 squadrons) of the 7th Honved, and one company of cyclists.

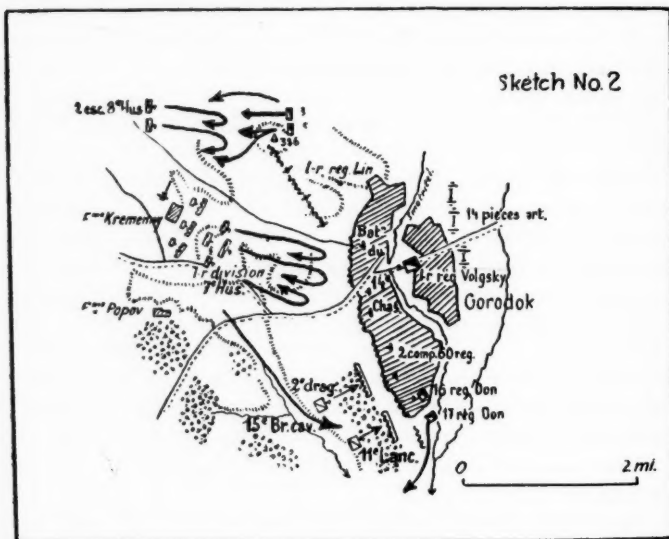
"The main body (under command of General Coblentz) comprising the 2d group of the 7th Honved, the 6th and 8th Honved Hussars, the 15th Cavalry Brigade

and the combat and heavy train. Main body will march at 7:00 AM.

"The 32d Rifle Battalion (Colonel Strauer) will cover the crossing of the Zbroutch River."

At 3:40 AM, the advance guard of this Division reached Satanov and after crossing the Zbroutch attacked in the direction of Lisobody.

At 10:00 AM, the 1st Kouban Regiment, after a short fight, began to fall back on Gorodok. At the same time, towards the south, the Austro-Hungarian cavalry forced the passage of the Zbroutch and menaced Kamenets Podolsk. General Pavlov directed his troops to take their places of combat at Gorodok. (See Sketch No. 2.)



A battalion of the 14th Chasseurs occupied the outskirts to the west of Gorodok, trenches having been dug the night before. At their right he placed the dismounted Cossacks of the 1st Kouban Regiment, the machine guns being distributed among the troops, assuring protection to the extreme right. On the left he brought up the Don Brigade, several troops having been dismounted, the remainder forming a reserve, partially mounted. In the market place of Gorodok the 1st Terek Regiment constituted his general reserve. Behind and

to the north of this position, the artillery had been put in position.

Toward noon, the Austrian cavalry appeared to the south of Lisovody advancing on the Russian position. (See Sketch No. 1.) Furious saber hand-to-hand fighting developed between the Cossacks and their adversaries.

The main action began about 2:00 PM. The Austrian artillery, from positions near the Kremenny Farm, opened fire on a Russian convoy which spread out from Gorodok toward Jarmalinci; this fire was immediately returned by the Russian artillery. At the same time the lines of dismounted cavalry debouched from the wooded area bordering the outskirts south of Gorodok.

About 3:00 PM, the main body of the Austrian 5th Cavalry Division debouched in the region of Kremenny Farm. General Frohreich, commanding the division, immediately gave the following order to attack:

"The 23d Brigade on the left will advance in direction of the red houses on the Efimov factory; the 15th Brigade on the right will advance on the southern edge of Gorodok."

All initiative was left to the brigade commanders as to the manner of attack; no indication was given them as to artillery fire-support.

In each brigade the cavalymen dismounted and, when the artillery opened fire on the Russian positions, each advanced in their zone of action along the Satanov road. The advance of the Austrians, under the heavy artillery and machine-gun fire of the Russians, was very slow.

At 4:00 PM the fire became intense. Projectiles destroyed the Russian trenches, but the Russian infantry and the 1st Kouban Regiment did not suffer greatly. Realizing that the dismounted cavalry action was doing very little to decide the issue, General Frohreich decided to try to penetrate the center of the Russians by a mounted attack. Three squadrons of the 2d group of the 7th Honved Hussars, under Major Barzay, assembled under cover behind the small knoll on the Kremenny Farm in preparation for the attack, which was in three lines, each with a squadron in line, with a distance of 200 paces between squadrons.

The Russians having noticed the approach of the Austrian cavalry by a cloud of dust which they raised, took then under

fire. Men and horses fell, but in reduced numbers the charge advanced, followed by a line of dismounted cavalrymen whose horses had fallen. The Russian position was overwhelmed by the fire of the Austrian artillery which took part in the action from positions to the west of Gorodok. Not a single shot was fired by the Russian front lines until the Austrian cavalry arrived within 800 paces of the Russian position, when the battalion of the 14th Rifles and the two companies of the 60th Infantry opened with rifle and machine-gun fire. When troops of the 1st Kouban Regiment began to fire machine guns into the left flank of the attackers, the lines of the attacking cavalry wavered, thinned, and broke; small groups formed and galloped in all directions, extending the front of the charge and scattering bodies of horses and men in all directions.

The mounted attack was repulsed. The group of the 7th Honved Hussars was almost entirely wiped out. All its officers and most of the men were dead or wounded, the latter being made prisoners.

The Russians had a group of machine guns at the extreme right of the Russian line, a most favorable position for flanking fire against the oncoming attack of the enemy. This group of machine guns was protected by the 3d and 5th Troops of the 1st Kouban Regiment. The machine guns covered about 1000 yards to their front, up to the Kremenny Farm, where the Austrian artillery was in action supporting the charge.

Taken suddenly under bursts of machine-gun fire, the Austrian artillery turned two cannons on hill 326, and two squadrons of Austrian cavalry left in two waves to attack the machine-gun nest. At the same time the 3d and 5th Troops of the 1st Koubans appeared and charged into the 2 squadrons of the Austrian cavalry.

A very short but extremely bloody hand-to-hand fight followed. Into the ranks of the disorganized Hussars, the Cossacks, insensible to losses, charged with fury.

The Kouban Cossacks were noted fencers, and literally pierced their adversaries with the points of their sabers. Very soon, the Hussars having lost, among others, the two squadron commanders, and seeing other troops coming to the aid of their enemy, retired, pursued by the Cossacks, who continued pursuit until they came under fire of the Austro-Hungarian infantry.

Likewise the attack of the Austrian 23d Brigade, not only had been blocked but was seriously menaced on its left because its artillery, too exposed near the Kremenny Farm, was obliged to retire to the rear, abandoning the support of the brigade. Toward the south, the Austrian 15th Brigade could not advance farther than the line it had attained in the morning's fight.

The Russian 17th Don Regiment advanced mounted against the exterior flank of the 15th Brigade, and one troop of the 1st Terek Regiment tried to enter Satanov to prevent the retreat of the enemy.

General Frohreich, in order to save what he could while time permitted, gave the order for a general retreat, which was executed in the greatest disorder. Three cannons, many vehicles, and much equipment were abandoned along the route. At the same time, the Austrian 32d Rifle Battalion, which held Satanov, took the Austrian cavalry, in the ebbing light, for Cossacks, and began firing on them. A panic ensued which was augmented because of lack of all responsible command—the commander of the Austrian 5th Cavalry Division, desperate because of his defeat, having committed suicide.

The Austro-Hungarian losses were serious—more than 500 Hussars were buried in the cemetery of Gorodok—their material and moral state was destroyed to such an extent that the division (what was left of it) had to be assembled in the rear for reconstitution in men and material.

The Russian losses did not exceed 60 killed and wounded, 50% of whom pertained to the two groups of Cossacks which went to the right flank to succor the machine guns and fought hand-to-hand with the Honved Hussars.

The Austrian cavalry that had crossed the Zbroutch in the sector held by the frontier guards, occupied Kamenets Podolsk on 17 August, and pushed on to the east on the 18th. But after the annihilation of the Austrian 5th Cavalry Division at Gorodok, and under pressure of a division of Kouban Cossacks recently arrived, they withdrew behind the Zbroutch.

On 18 August Russian territory was completely free of the enemy, and the Army of General Brussilov was able to pass at once to the offensive.

The battle of Gorodok presents on the Russian side, an example of a fight wherein the combined action of cavalry and infantry terminated happily.

The Russian commander had organized a center of resistance at Gorodok with his infantry and artillery, placing his cavalry on the flanks, where the possibilities of movement most favored it.

During most of the combat, the Russian division utilized its fire to stop the efforts, mounted and dismounted, of the Austrians.

The Russian General Pavlov had an excellent chance of completely cutting off the retreating Austrians, but he sent only one troop to Satanov. This force was entirely inadequate for this mission. It would have been better if he had used a regiment (1st Terek) which had not been employed in the attack. On the Austrian side great heroism was displayed, particularly in the attack against the Russian position, but the Austrian commander failed to use his infantry to support the cavalry; even though superior in numbers he was practically annihilated. He employed his cavalry separately and not at all under the rules governing the use of combined arms.

Section 3

DIRECTORY OF PERIODICALS

Included in this directory are only those periodicals from which articles have been selected.

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Section 4

CATALOG OF SELECTED PERIODICAL ARTICLES

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- (1) OUR GAS CRISIS. By "Gunner"

30 July 1936

- (2) AIR DEFENCE EXERCISES, 1936. (I) Flying Officer Dunworth
(3) IF IT HAPPENED TO-DAY! WAR FROM THE AIR. Captain Broad
(4) FOOD SUPPLY IN TIME OF WAR. Sir George Courthope

6 August 1936

- (5) CANADIAN FOREIGN POLICY. By Canadian Correspondent
(6) FUTURE VETERANS. A SATIRE AND A REAL PROBLEM. Walton
(7) THE AIR DEFENCE EXERCISES, 1936. (II) Flying Officer Dunworth

13 August 1936

- (8) BRITISH FOREIGN POLICY. Walton
(9) THE OPERATIONAL PROBLEM IN PALESTINE. Katin

20 August 1936

- (10) PLANS, COUNSEL AND EXECUTION IN DEFENCE. Lieut.-Colonel Blacker
(11) MANOEUVRES IN U.S.A. ARMY

27 August 1936

- (12) CIRCUMSPECT JAPAN. Captain von Rintelen

3 September 1936

- (13) THE PROBLEM OF INTERCEPTION OF BOMBER RAIDS. First Lieutenant Feuchter, Retired, German Army
(14) GAS IN THE ITALO-ABYSSINIAN CAMPAIGN. Major Murphy

10 September 1936

- (15) AIR POWER THE KEYSTONE IN OUR DEFENCE PROBLEM. Major General Fuller
(16) AIRCRAFT AND THE MEDICAL SERVICES. Flying Officer Dunworth

17 September 1936

- (17) "THE BEST GAS TARGET IN EUROPE." Major Murphy
(18) A FORGOTTEN WARRIOR—RICHARD DEANE. Colonel Beadon
(19) OUR NEED OF AIRSHIPS IN THE NEXT WAR. Captain Sinclair

24 September 1936

- (20) WILL THE LABOUR PARTY ADOPT A NEW POLICY TOWARDS RE-ARMAMENT? Lord Strabolgi
(21) ALLEGIANCE IN A LEAGUE FORCE. Major Parkes

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- (22) FACTS ABOUT AIR RAIDS. Major-General Fuller
- (23) THE ALLIED PLAN OF CAMPAIGN FOR 1918. From inside the Supreme War Council
- (24) YUGOSLAVIA'S NEW ARMY. Brown
- (25) THE AIR FORCE IN EGYPT. By our Air Correspondent

8 October 1936

- (26) EUROPE'S LEAST KNOWN ARMY. Brown

15 October 1936

- (27) AN AMERICAN ON GOVERNMENT AND DEFENCE
- (28) IS TECHNICAL RE-ARMAMENT ENOUGH? Captain Macnamara
- (29) THE STRATEGIC RESERVE, 1918. From inside the Supreme War Council

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- (1) INDUSTRY AND NATIONAL DEFENSE. Colonel Harris
- (2) A NOVEL MACHINE GUN MECHANISM. Lieut.Colonel Goddard
- (3) THE ITALO-ETHIOPIAN WAR. Major General Fuller
- (4) PERPETUATING OUR MILITARY PAST. Chatelain
- (5) ANOTHER DARDANELLES "IF." Major Fisher
- (6) AMMUNITION SUPPLY. Part I. Major Marsh

July-August 1936

- (7) LAND, SEA AND AIR WARFARE. Nickerson
- (8) THE MECHANISM OF SMOKE SCREENS. Kibler
- (9) ROCK ISLAND ARSENAL LABORATORY. Captain Fletcher
- (10) THE CONFEDERATE MEDICAL DEPARTMENT. Hall
- (11) AMMUNITION SUPPLY. Part II. Major Marsh

September-October 1936

- (12) PRESENT ORDNANCE PROBLEMS. Major General Tschappat
- (13) THE SIGNAL CORPS IN ACTION. Major General Allison
- (14) WHAT PRICE AUTOMATIC? COMMENTS ON THE DEVELOPMENT OF A NEW ARM. (I) Lieutenant Johnson, Jr.
- (15) FORCE AND POLICY. Lieut.Colonel Scammell
- (16) THE "PEPPER-BOX" PISTOL. Haw
- (17) MILITARY MOTOR TRANSPORT. (I) Colonel Taylor
- (18) MACHINING ALUMINUM. Captain Taber
- (19) AMMUNITION SUPPLY. Part III. Major Marsh

ARMY QUARTERLY (Great Britain)

October 1936

- (1) THE FRENCH OFFICIAL HISTORY: 1ST OF MAY—18TH OF JULY, 1918
THE LAST TWO GERMAN OFFENSIVES: THE BATTLE OF THE MATZ AND THE SECOND BATTLE OF THE MARNE
- (2) MILITARY ASPECTS OF THE NEW TURKISH RAILWAYS. Allen
- (3) MESOPOTAMIA. Captain Kirkby
- (4) "THE OTHER SIDE OF THE HILL." No. XV. THE BATTLE OF VIMY RIDGE: 9TH OF APRIL, 1917
- (5) GERMAN STRATEGY IN 1914 AND IN THE FUTURE. Major Yeates
- (6) GERMANY'S POLITICAL PREPARATIONS FOR WAR WITH THE SOVIET UNION. By V.T.
- (7) MEMOIRS OF A FIGHTING MAN DURING THE INDIAN MUTINY. EXTRACTS FROM THE DIARY OF THE LATE SERGEANT THOMAS ANDERSON, E TROOP, ROYAL HORSE ARTILLERY. Waine
- (8) METHODS OF INSTRUCTION IN CHEMICAL WARFARE EMPLOYED BY THE UNITED STATES ARMY. Captain Sadtler, U.S. Army
- (9) THE HIGHER LEADING. FIELD SERVICE REGULATIONS, PART III, 1935

BULLETIN BELGE DES SCIENCES MILITAIRES (Belgium)

By Captain Wendell G. Johnson, Infantry

April 1936

(1) LA BRIGADE LÉGÈRE SUÉDOISE. [The Swedish Light Brigade.]

The new cavalry brigade of the Swedish Army, which is reorganizing its light troops, comprises a headquarters with signal troops, two cavalry regiments, a battalion of light troops, an artillery group of three batteries, an engineer company and necessary repair, supply and evacuation services.

The cavalry regiment consists of a headquarters, three horse troops, a cyclist troop, a heavy troop with three platoons of machine guns and mortars, a motorized unit of antiaircraft, a motorized platoon of cannons and a tank troop.

The light battalion had a headquarters, two motorized troops, an armored troop, and an artillery unit. This force has a total strength of 5000 men, 2500 horses, 200 wagons, 300 trucks, 80 tractors, 800 bicycles, 12 tanks, 100 machine guns, 20 light mortars, 12 light artillery guns, and 10 37-mm. guns.

(2) WAFFEN UND GLIEDERUNG DER TANKABWEHR. [The arms and organization of antitank defense.]

Counting on the German organization of three cannons and six rifles in the antitank company of the infantry battalion, the author holds that with a 10 per cent score, the 225 shots which could be fired in the 150 seconds available for effective fire of attacking tanks, would stop 22 out of a probable 33 tanks in the first attacking wave. Besides this a few would be stopped by mines, destructions, and obstacles, as well as the other fires organized in depth, so that 80 per cent casualties might well result, which would certainly demoralize the attack.

As for mines, it is recommended that 1000 be used on each 500 yards of front, the mines to be placed 5 yards apart on a depth of 10 rows. To handle the mines there should be an engineer company with each regiment in order to give a platoon to each battalion of the regiment.

Time permitting, the infantry should dig antitank trenches, having a long slope on the enemy side and a steep wall on the other side. Thus, rapidly moving tanks should theoretically ride down the long slope and butt up against the steep wall and stay put, or at least be unable to cross without considerable delay. Meanwhile, well-sited antitank guns are in action.

Outposts have few, if any, antitank guns, and should therefore be reinforced by engineers and mines.

Delaying actions cannot possibly be sustained against mechanized attacks when battalions are stretched over double their usual frontage. Nor can reinforcements be expected from reserve units for they need all the antitank weapons organically belonging to them. The only solution lies in a special unit—"antitank weapons and engineers"—capable of supporting units in line or of guarding a particular flank by themselves.

Such a unit, suggests the author, should be a special brigade within each three-corps army. The brigade should have three battalions of antitank weapons and three battalions of engineers, as well as the necessary signal, antiaircraft, reconnaissance, and artillery elements.

Its missions would be:

- (a) Complete support of an army corps.
- (b) Support of divisions by detaching one antitank company and one engineer company to each infantry division.
- (c) Guarding the flank of the army.

With three cannons and six rifles in each platoon, three platoons in each company, three companies in a battalion, and three antitank battalions in a brigade, there would be a total of 81 antitank guns and 162 antitank rifles in the force. With 50 per cent of its arms in the forward echelon, the author considers that this "Sperr-brigade" could hold 62 miles of front (covering roads and likely routes of approach).

(3) LE CANON ANTICARS "HOTCHKISS" DE 25 MILLIMÈTRES. [The Hotchkiss 25-mm. antitank gun.]

According to certain reports, the French army has adopted the 25-mm. Hotchkiss gun. This little rapid fire cannon has a muzzle velocity of 2,860 feet per second and a range of 9,200 yards. The magazine holds 10 shells and the rate of fire is 100 rounds per minute. The gun uses armor-piercing, high explosive, and tracer ammunition. The three-quarter-pound armor-piercing shell will pierce 1 1/3 inch of armor at 1,500 yards and less; the tracer bullet can be seen for 3,800 yards. The gun weighs 880 pounds.

(4) LE CHAR DE COMBAT "L. 80." [The Swedish tank "L. 80."]

The Landsverk "L. 80" tank is considered the best produced to date. It travels 28 miles per hour on tracks and 45 miles per hour on wheels with its 130 horse-power motor. It carries a Madsen machine gun and a Madsen 20-mm. cannon, which enable it to attack hostile tanks and low-flying attack planes, as well as animate targets.

The weight is 7 tons; armor, 0.4 inch; length, 15 feet; width, 7.7 feet; height, 6.35 feet; crew, 3 men.

The suspension gives a very stable mount which permits accurate fire during movement. The gunner uses a special periscope to automatically maneuver the guns.

Gas protection is assured. Moreover, a panoramic periscope allows the commander to watch the entire horizon without moving his head and without moving the turret. He has an auxiliary steering device and controls by which he can immediately move the tank to the rear at 20 miles per hour.

(5) TROUPES MÉCANISÉES. [Mechanized troops.] Colonel Suderian

The author estimates the armored combat vehicles of European armies (including the Soviet) at 16,000. All the recently built tanks have an average speed of 18 miles per hour and a combat speed of 12 miles per hour. All are protected from infantry small-arms fire, and the French even have some to withstand large caliber shells.

In all armies there are: Light armored reconnaissance vehicles armed with machine guns for security and capable of attacking unprotected objectives; vehicles carrying antitank guns; motorized vehicles armed with 75-mm. guns and larger cannons and used as accompanying weapons or for distant firing.

The author gives us his estimate of how air and mechanized forces will operate at the outset of the next war against industrial, vital and political points in enemy territory. Deep attacks will be made by mechanized elements while infantry divisions occupy and defend the territory gained.

The enemy will, of course, seek to defend himself against tanks by using natural obstacles like water courses, mountains, woods, and marshes, as well as by artificial obstacles like abatis, demolitions, and mine fields.

Antitank guns must accompany the mechanized force because it will often have need of them when it encounters the hostile armored elements, which sooner or later is bound to happen.

(6) L'EMPLOI ÉVENTUEL DE LA TÉLÉVISION DANS LES OPÉRATIONS DE GUERRE. [The eventual use of television in war.] Lieut. Colonel Gatta

Among modern inventions, television stands out as one that military engineers are ready to seize and adapt to communication purposes when it has been further developed.

There is always a big delay between the occurrence of an event on the front and the time it is known by the commanders seeking to control the action from their command posts. Television may provide the means for keeping the various commanders abreast of the situation.

May 1936

(7) LES OPÉRATIONS MILITAIRES À LA FRONTIÈRE EST DE LA PROVINCE ORIENTALE PENDANT LA CAMPAGNE 1914-1918. [The military operations on the eastern frontier of the East Province (Africa) during the World War.] (1) Lieutenant Bayot

The "Bulletin Belge des Sciences Militaires" against takes up the publication of the operations of 1914-1918 in what they term the "Province Orientale," which is better known to us as the German East African Cam-

paign. This work was begun in June and July of 1934, but not continued until the May 1936 issue.

(8) DÉFENSE CONTRE LES CHARS ET EXEMPLE D'ÉTUDE DU TERRAIN. [Antitank defense and example of terrain study.] Major Wanty and Lieutenant Willemart

Antitank defense is one of the foremost military questions today. Three opinions have come from this controversial problem which are definitely recognized as logical facts:

(a) The best guarantee against tanks is obtained by the proper location of a position where continuous obstacles of an impassable or almost impassable nature can be utilized, or where woods and centers of resistance are available.

(b) The passive and active defense must be closely combined.

(c) The antitank defense must be organized in depth as well as along the front.

The question immediately arises, "how many guns"? The Belgian infantry division has 8 (to be increased to 36); the French, 18; 54 in Germany; and General von Eimannsberger, specialist in this subject, advocates 72 per division.

The terrain is, of course, the primary governing factor, and next to it is the type of weapon used—horizontal field of fire, rapidity of fire, penetrating power.

Mines constitute the most effective means in the passive defense. The seemingly great number of mines needed is balanced by the reduction in artillery ammunition that results. Moreover, it is possible to diminish the quantity of mines by carefully placing them as the terrain dictates.

Take, for example, an embankment; a few well placed mines make it a formidable obstacle. Simulated mines can create enough fear in the minds of the hostile tank crews to accomplish great results because they are certain to proceed cautiously where they expect mines to be.

Another controversial point is where to locate the antitank guns (47-mm.); near the front of the position, or back at some depth in the position. Placed well forward, a gun can usually have a better field of fire and engage hostile tanks early enough to stop them provided they come within the field of fire of the gun and the firing is accurate. Failing in these conditions, the gun may be of no use or may be destroyed by enemy fire. Again, the terrain is the determinant. There is no definite solution.

Lieutenant Willemart follows the introductory discussion by Major Wantz with an example of a terrain study from the point of view of preparing its antitank defense.

(9) UN TOURNANT DE LA STRATÉGIE ET DE LA TACTIQUE. [A turning point in strategy and tactics.] Captain Commander Gerard

Military art has reached a turn in its evolution, owing to motorization. This new means changes the problem of concentrating forces, multiplies the strategical and tactical combinations, modifies current ideas on security, and amplifies the possibilities of surprise.

Mechanization, moreover, by increasing the mobility of weapons and by reducing their vulnerability with armor, makes it possible to overcome the hitherto powerful musketry fire and push elements of fire intact into a defensive position.

These two means, mechanization and motorization, accelerate the pace of operations and of combat. The day's march of a motorized unit has increased ten-fold over the former 12 miles made by the foot soldier.

Tremendous possibilities can be imagined for the motor-mechanized army, but there are means for stopping it. Foremost is the terrain, which with its watercourses, marshes, embankments, ravines, and thick woods will hinder the advance of motorized forces.

The obstacles thus presented can be completed by the use of destructions, obstructions, inundations, creation of artificial obstacles, or the placing of mines. Besides these means we have the cannon and the armor-piercing bullet.

Yet the defender is still handicapped by the initiative of the attacker who now has added power and unequalled speed.

There is little time to make counter-preparations, and the defender must be protected on all sides. Security through distance no longer holds. Light elements, a day's march in advance, must be replaced by something more effective.

Delaying actions with weak forces or automatic weapons forcing the attacker to deploy, are no longer possible except where favored by insurmountable obstacles.

Handfuls of troops are lost. There must be a cannon to meet mechanized elements at every center of resistance, and uncrossable obstacles must protect the flanks. Only thus can the necessary time be gained to organize a position and carry out the required construction of obstacles.

Herein distant reconnaissance becomes an even greater necessity, which means that observation aviation enlarges its field of action. Air superiority will be one of the requisites of success.

The modern army, upon reaching the hostile defensive position which its advance guard could not penetrate, will immediately prepare to attack. Troops will detruck as near the enemy as their carriers can take them on trails and across country.

Under cover, the tanks and motorized artillery will assume their attack formations:

Light tanks carrying infantry or destined to accompany infantry
Medium tanks with the mission of destroying resistance within the
depth of the hostile position

Heavy tanks directed against the enemy artillery.

The attack will come swiftly without any tedious placing of artillery and preparation fires. Having overrun the adversary, the light tanks will take up the traditional role of cavalry and pursue and harass the retreating enemy.

Such might be the possible enactment of a future attack.

To break up such an attack the defender must use all his reserves. The means are well known—destruction on roads first, then on the battlefield; the cannon and armor-piercing bullet; and obstacles.

The problem is how to organize the defense.

The outposts must first be considered. Their mission of delaying the enemy while the position is being organized becomes increasingly important in modern war.

A thin line would be a useless exposure to no purpose. Only a deep defense supported by natural or artificial obstacles and numerous antitank guns can successfully oppose the enemy thrust.

One system would be to create successive lines of combat groups (platoons, for example), disposed in checkerboard fashion and mutually flanking, and placing rifle fire in the intervals of the preceding line of combat groups. Thus the fire of modern infantry would create strong curtains of continuous successive fires, reinforced by the fire of other elements in rear.

Within this arrangement would be echeloned a deep antitank defense by placing cannons in the combat groups. Such an organization would demand numerous antitank guns. Strongly held, and supported by artillery, these outguards, as formerly, would have the mission of holding to the end. Such a system of outposts does not readily suffer reduction. But when the position is ready to accept battle, only small warning elements should be kept in the outposts and their mission would terminate upon the arrival of superior forces.

Behind, the defense would be organized: With the support of an important obstacle; in depth; with a strong antitank defense including the artillery; with artificial tank obstacles; with dispositions giving good fields of fire to antitank guns; with troops stationed so that the position could be occupied almost instantly.

The success of the defense will depend on the elasticity of the arrangement. Even though dislocated, the organization must not be broken. Rear echelons supported by artillery must be ready to counterattack and restore the system. The artillery must be especially flexible and alert in modern warfare.

A delaying action, in the face of a strong, modernly equipped force, now becomes not only even more delicate than formerly, but almost impos-

sible. The defender himself must exploit the possibilities of displacement offered by motorization and mechanization. Only thus can he get his units together in time to meet the adversary on his own terms.

One can foretell that in the future armies will be completely motorized. It is not possible, however, that all their means will be mechanized—financial reasons, alone, among others, prevent that. Yet the defender must be ready to meet mechanized elements anywhere.

The tank also can be defeated. But motors have altered military tactics. The rate of march of armies has risen tenfold and the stopping power of musketry is conquered. A new period in military history is beginning.

(10) *POIDS Lourds et Autostrades*. [Heavy tonnage and motor highways.] General Serrigny

The author studies the development of German heavy truck production and of her highway construction, both of which have been accelerated during the past three years, along with the army and armament reorganization. Today 15-ton trucks circulate on German roads, and it is likely that 400 or 500 horsepower motors will drive 50-ton trucks over these roads within a couple of years. To build them, the chancellor has not hesitated to spend a billion dollars.

The new highways are boulevards with separate lanes for each direction of traffic, each of which is from 24 to 39 feet wide, with a center dividing strip 13 feet wide, which is planted with hedges to prevent headlight glare from the other lane. In places the concrete on these roads is 23 inches thick. There are no crossings, no grade crossings, and no towns are traversed. Only the important roads connect with these highways, and do so by ramps which lead on parallel with the flow of traffic; hence there are no interruptions to traffic.

It is estimated that over 700 miles of these superhighways will be open for use by the end of 1936, and a similar mileage added each year thereafter until the planned 4,500 mile total has been reached.

General Serrigny concludes his study by pointing out the formidable military power of such a transport means, the menace that it creates for neighboring countries, and the enormous possibilities which it gives to strategy. Comparing it with what has been done in France, he urges that immediate steps be taken to improve the highway situation in France behind the fortified frontier.

(11) *LES ARMES Lourdes de l'Infanterie Italienne*. [The heavy weapons of Italian infantry.]

Among the new infantry weapons of the Italian Army is the 45-mm. grenade thrower or mortar called the "Tromboncino" model 1935. The barrel, base, and two boxes of ammunition can be carried by three men. The range is from 100 to 550 yards; rate of fire, from 8 to 10 rounds per minute, and radius of burst, about 15 or 20 yards.

Each infantry battalion will have a platoon of three teams with three "tromboncinos" each.

The Italian antitank gun is a 47-mm. weapon weighing under 600 pounds. It may be towed, put on a wagon, or carried in a truck. Its value lies in its ease of changing direction, in its remarkable precision, its rapidity of fire, and in its ability to pierce the armor of a medium, or even a heavy tank at 500 yards, or of a light tank at 1100 yards. At present the platoon of antitank guns is attached to the division.

(12) *LES PARACHUTISTES de l'Armée Rouge*. [The parachutists of the Red Army.]

Parachute descents in mass are now a commonplace in Soviet Russia, where parachute jumping has gone beyond the stage of being a sport and has acquired a technique of unquestioned importance. Groups of 1200, 1800, and even more men have descended fully armed and gone into action upon landing.

(13) *LES CHARS de Combat et l'Infanterie*. [Tanks and infantry.] Braun

It is generally admitted that tanks should attack in mass, but no one knows exactly how great the mass should be. Should there be a battalion, a regiment, or even a mechanized division?

Is one tank battalion enough support for an infantry division attacking a strong enemy position? The author believes not, if this position has modern antitank equipment. Rather should there be at least a regiment of tanks in order to get through the enemy position.

At the last Russian maneuvers, 1000 tanks were launched on a 6 or 7 mile front; that is, about 12 battalions or 4 regiments were used. In this sector, the 4 mechanized regiments attacked successively four objectives, or one per regiment. In each regiment the three battalions were side by side.

Current regulations prescribe that the normal width of the front assigned a battalion of tanks will not exceed 1650 yards; that is, 5000 for the three battalions abreast, or roughly, one-half of the front of the division above.

The tanks operate within the entire 3-mile depth of the defensive position. The waves of tanks follow each other at 300 yards, each battalion attacking in three waves.

In open warfare, the allotment of four tank regiments per division is impossible (a six-division army would require 6000 tanks). The normal and adequate proportion appears to be one battalion per division. This does not mean there must be one battalion organically assigned to each division. Rather, the tanks should be looked upon as corps troops to be allotted to a division at the rate of one, two, or even three battalions, if necessary. Thus, one division might have an entire tank regiment; another will have none.

(14) AUTRICHE: NOUVELLES FORMATIONS BLINDÉES. [Austria: New armored formations.]

On 14 February 1936, the Vienna garrison carried out a big maneuver south of the city in which the army used for the first time its new tanks and antitank weapons.

The infantry battalion uses a 47-mm. antitank gun. The artillery now has a 150-mm. howitzer and a 150-mm. gun. The armored units consisted of a battalion of heavy armored cars and light two-men tanks.

(15) EMPLOI DE CHIENS DE LIAISON PAR L'ARMÉE JAPONAISE. [Use of liaison dogs by the Japanese army.]

Following the example of the German army, the Japanese are systematically organizing liaison by dogs in infantry units. Not many have been trained to date, but it is likely that some have already seen action in Manchuria.

June 1936

(16) LES OPÉRATIONS MILITAIRES À LA FRONTIÈRE EST DE LA PROVINCE ORIENTALE PENDANT LA CAMPAGNE 1914-1918. [Military operations on the eastern frontier of the Eastern Province (Africa) during the World War.]

(II) Lieutenant Bayot

Continuing the narrative of Belgian participation in the campaign against German forces in East Africa during 1914-18.

(17) LE 18 JUIN 1815 À WAVRE. [The 18th of June 1815 at Wavre.] Major Braunders

The author gives a brief account of the one-day struggle which took place at Wavre as a part of the historic battle known as "Waterloo."

(18) LA PROTECTION DU CHARROI DES GRANDES UNITÉS CONTRE LES ENTREPRISES TERRESTRES DE L'ENNEMI. [Protection of the trains of large forces against hostile ground operations.] Captain Danneels

The author divides his article into two parts; in the first he discusses the trains of the German First Army from 6 to 13 September 1914, when threatened by the British Army and the French Fifth Army. In the second part he takes up the anti-mechanized defense of the trains of a flank army corps, when threatened by mechanized elements consisting of motorcycles carrying machine guns, reinforced by armored cars, which is looked upon as the force most likely to be launched against rear area installations and columns of trains.

(19) LA DIVISION MODERNE. [The modern division.] General v.Tschisch-witz

In every army, and ever since the Napoleonic epoch, the infantry division has formed the nucleus of the armed forces of all nations.

The author considers what, at the present moment, should be the ideal organization of an infantry division in order that it may be able to carry out all the missions to be expected of it. In support of his thesis, the author takes as a basis various foreign organizations, principally those of France, England, Germany, and U.S.S.R.

In general, the infantry regiment comprises three battalions of three rifle companies and one machine-gun company.

The *minenwerfers* (of about 80-mm.) which are to assist the mortars in their plunging fire, the accompanying guns (of about 70-mm.) which engage exposed objectives, and the antitank guns (about 40-mm.) are either partly distributed among the battalions or grouped in one company under regimental control.

It is noteworthy that if infantry is accompanied and assisted by the other arms (artillery, engineers, aviation, tanks), it can fight with its own means and is the only arm able to do so.

To provide the reconnaissance required by the division, one troop of cavalry no longer suffices. The improvement in armament and the use of armored cars demands that the reconnaissance detachment have one or two cavalry troops, a bicycle company or a motorcycle company with side-cars and automatic arms, from two to four armored cars and one motorized radio platoon. This unit comprises fire-power with speed and is capable of solving all the problems met by ground reconnaissance.

As for air reconnaissance, there should be a squadron of eight to twelve planes attached to the division.

Division artillery should be able to: open a way for infantry through accessory defenses, accompany it, and give it the needed fires—principally neutralization fires on enemy artillery.

The conclusion is obvious: the more artillery, the better. But there are limits imposed by ammunition supply, the unwieldiness of division columns, etc.

Considering only the problem of munitions, each gun must be provided with two days of fire (including what is in the trains); which means an average of 800 rounds per field piece and 400 per heavy gun.

In consequence, it is reasonable to allot the division artillery nine light batteries and from six to nine heavy batteries. It is admitted that the division normally receives reinforcements or supporting fire either from corps or army artillery.

Considerable mobility is required of the division artillery. The field batteries will be horse-drawn, the others motorized. The anti-aircraft guns will be motorized and centralized under division headquarters.

The author further provides an observation detachment (*Beobachtungsabteilung*) to attach to the division artillery, which will contain principally the topographical and meteorological stations.

The engineer units, which have such important missions in modern war, must be adequate in size and be motorized. Moreover, the bridging equipment ought to be strong enough to carry all the motorized elements of the division.

As for the division signal troops, they should have two telephone companies and one radio company.

Division troops should consist of: (a) A motorized sanitary unit having a sanitary company, one or two aid stations, and an ambulance column. (b) A veterinary section. (c) Quartermaster: one or two field bakeries, a butchering section. (d) Supplies: one or several columns of six trucks (?), one or two repair platoons, a company of laborers. (e) A baggage and postal service.

Inasmuch as horse-drawn elements are being transformed more and more into motorized elements, the author makes several comments on the subject among which he says that the horse-drawn transport alone of an infantry regiment would require about 600 trucks.

(20) GRANDE-BRETAGNE: UN SILENCIEUX POUR MOTEURS D'AVION. [Great Britain: A silencer for airplane motors.]

The Bristol Company has built a collector ring for exhaust gases of radial air-cooled motors, which is effective and is to be put on all of their motors now being constructed.

(21) GRANDE BRETAGNE: PRÉSENTATION D'UN AVION MILITAIRE BRITANNIQUE HAUTE PERFORMANCE. [Great Britain: Presentation of an excellent British military airplane.]

The new "Fairey" light bombardment plane is an all-metal monoplane equipped with a Rolls Royce "Merlin" motor, which propels the plane at close to 280 miles per hour. Its high speed demonstrates the growing difficulties to be encountered by air defense owing to the reduced time allowed for warning to be given to antiaircraft units.

(22) U.R.S.S.: APPAREILS D'OUVERTURE AUTOMATIQUE POUR PARACHUTES. [U.S.S.R.: Automatic opening devices for parachutes.]

A new automatic parachute-opening device is announced from Russia. It is contained in a small case and looks like a baby alarm clock. It is attached to the outside of the parachute bag and connected with the opening ring. An adjusting hand can be set to cause the chute to open in from 5 to 25 seconds after release from the plane.

(23) L'EMPLOI DU CHAR DE COMBAT COMME "CHASSEUR DE CHARS." [Use of the tank as a tank chaser.] Dr. Topf

The author contends that tanks alone are not an efficacious means for countering an armored attack. Rather, he thinks, should antitank guns oppose the hostile mechanized attack while the tanks be kept in hand for a counterattack against the hostile infantry when its tanks are no longer available for its assistance. Dr. Topf maintains that the division should have organically both a tank and an antitank unit.

(24) POLOGNE: EMPLOI TACTIQUE DES MOTOCYCLETTES. [Poland: Tactical employment of motorcycles.] Captain Chrzanowski

The author says that motorcycles should be used in the reconnoitering of roads and bridges. They are above all the rapid elements of armored formations covering the front, flanks, and rear. The fire-power of these units enable them to repel weak advance elements of the enemy. In open warfare motorcycles can swiftly occupy and guard important terrain features until the arrival of the main body of armored forces.

(25) DISSIMULATION À LA VUE ET CAMOUFLAGE. [Concealment from view and camouflage.] Lieutenant Contadini

The author discusses the need, possibilities and methods of dissimulation and camouflage used in offensive and defensive actions. He also covers the various materials used and the characteristics of each. Barbed wire and simulated entanglements, trenches, gun emplacements, command posts, and other installations to be screened are taken up in turn.

CANADIAN DEFENCE QUARTERLY (Canada)

October 1936

(1) PROGRESS AND PROBLEMS OF FIELD ENGINEERING

(2) NATIONAL POLICY AND MILITARY ORGANIZATION

(3) THE FUTURE FOR MACHINE GUNS IN THE ATTACK. Major van den

Berg

(4) CANVAS MODEL ON SAND TABLE DEMONSTRATION. THE BRIGADE, BATTALION, COMPANY AND SUPPORTING ARMS IN THE ATTACK

(5) THE DOUBLE ECHELON SYSTEM OF SUPPLY

(6) APPRECIATING THE SITUATION. Lieut.-Colonel Burns

CAVALRY JOURNAL

July-August 1936

(1) SPRING MARCH AND MANEUVERS OF THE CAVALRY SCHOOL BRIGADE

(2) PROGRESS IN CAVALRY MECHANIZATION: SCOUT CAR DEVELOPMENTS. Colonel Scott

(3) ONE SYSTEM OF REGIMENTAL TRAINING. Lieut. Colonel Bradford

(4) A VISIT TO SCENE OF CUSTER'S LAST STAND. Captain Busbey

(5) YET ANOTHER TREASURE AND PROBLEM FOR THE ARMY. Captain Theis

(6) A METHOD FOR DETERMINING CAVALRY MARCH PERIODS. Lieutenant Breden

Periodical Articles—Catalog

- (7) THE APPRENTICE STRATEGIST. General Camon, French Army
- (8) THE TANK JU-JU. Captain McGuire

September-October 1936

- (9) THE PART PLAYED BY THE 6TH CAVALRY IN THE INFANTRY SCHOOL MANEUVERS. Lieutenant Colonel Flynn
- (10) AN INCIDENT AND AN EXPERIMENT. Major Thomas
- (11) OUR FIRST NATIONAL GUARD CAVALRY DIVISION. Lieutenant Colonel Smith
- (12) PARTICIPATION OF THE UNITED STATES ARMY OLYMPIC EQUESTRIAN TEAM IN THE 1936 OLYMPIC GAMES. Captain Willems
- (13) THE 12TH INTERNATIONAL HORSE SHOW AT AACHEN, GERMANY. Major Bradford
- (14) 1936 CAMP OF 116TH CAVALRY, IDAHO NATIONAL GUARD. Captain Wright
- (15) SKIRTING LUZON IN A SCOUT CAR. Captain Withers
- (16) 113TH CAVALRY, IOWA NATIONAL GUARD, LEARNS VALUABLE LESSONS FROM MARCHING. Captain Hollowell
- (17) CAVALRY PACK TRANSPORTATION. Captain Robinett
- (18) UMPIRING. Lieutenant Colonel Keyes
- (19) CAVALRY RECONNAISSANCE DETACHMENTS ON RECONNAISSANCE. Lieutenant Britton
- (20) GAS ON A HOSTILE SHORE. Major Waitt
- (21) EXPERIMENTS IN WINTER OPERATION OF MOTOR TRANSPORTATION ASSIGNED TO A CAVALRY REGIMENT. Lieutenant Land
- (22) SUMMER CAMP OF 115TH CAVALRY, WYOMING NATIONAL GUARD. Lieutenant Marable

CAVALRY JOURNAL (Great Britain)

October 1936

- (1) TWO CAVALRY EPISODES IN THE PALESTINE CAMPAIGN, 1917-1918. Part I. General Barrow
- (2) THE YEOMANRY AT HUI, 8TH NOVEMBER, 1917. Major Teichman
- (3) SUDAN PATROL. Part I. Major Lamb
- (4) A SUGGESTED METHOD OF HANDLING REMOUNTS BASED ON THE LICHTWARK PROCEDURE. Major Perse
- (5) CAVALRY AND TANKS WITH MOHFORCE, 1935. Lieut.-Colonel Lawrence-Smith
- (6) THE GOLDEN AGE OF CAVALRY. Major Sheppard
- (7) THE ORGANIZATION OF THE CAVALRY OF FRENCH CONSULATE AND EMPIRE. By "Thistle"
- (8) CAVALRY IN INDIA IN 1804

COAST ARTILLERY JOURNAL

September-October 1936

- (1) THE INVASION AND CAPTURE OF THE BALTIC ISLANDS. Lieut. Colonel Green, and Captain Lanham
- (2) WARFARE IN THE 18TH CENTURY. (IV) Lieut. Colonel Scammell
- (3) ANTI-AIRCRAFT MACHINE GUN FIRE CONTROL—1936. Major Conway
- (4) CURVES AND FAST BALLS AT LEAVENWORTH. Major Cooke
- (5) THE DAY BEFORE CANTIGNY. Major Johnston
- (6) ADJUSTMENT OF ANTI-AIRCRAFT GUN FIRE. Major Harris
- (7) THE BACKBONE OF THE ARMY. Major Powers
- (8) THE ADVANCED COURSE STUDENT. Major Pearson

FIELD ARTILLERY JOURNAL

September-October 1936

- (1) THE CIRCULAR SHIFT. Captain Nicholas
- (2) MOUNTAIN TO MAHOMET—AND VICE VERSA. POSITIONS: 170 MILES AWAY. Lieutenant Wilson

- (3) TRUCKING—AND HOW. Captain Gardner
- (4) COUNTERBATTERY IN THE AEF. Colonel Lanza
- (5) CAN FIELD ARTILLERY MEET THE AIR ATTACK? Captain Greene
- (6) AUTOMATIC RIFLES FOR AA DEFENSE. Lieutenant Miller

FIGHTING FORCES (Great Britain)

August 1936

- (1) THE NAVAL "WAR STAFF." By "Nauticus"
- (2) THE RUSSIAN HIGH COMMAND IN MANCHURIA. Lieut.-Colonel Burne
- (3) A DOVER PATROL OF ROMAN TIMES. Admiral Bax
- (4) THE HUMAN ELEMENT IN WAR. By A.S.P.

October 1936

- (5) THE AMPHIBIOUS MANOEUVRES. Captain Tuke
- (6) THE VIMY RIDGE MEMORIAL. Captain Wynne
- (7) PORTRAIT OF A CORPS COMMANDER. By "Junior Captain"
- (8) CRITICIZING GENERALS. By "Diogenes"
- (9) THE BATTLE OF DUJAILA. Lieut.-Colonel Burne
- (10) THE NEW BRITISH BOMBERS. Harper

INFANTRY JOURNAL

September-October 1936

- (1) THE DAY BEFORE CANTIGNY. By the author of "Portrait of a Soldier"
- (2) GAS ON A HOSTILE SHORE. Major Waitt
- (3) TANKS, TRUCKS, TROOPS. Lieut.Colonel Olsmith
- (4) AN INTELLIGENCE CASE HISTORY. Major Schwien
- (5) THE INVASION AND CAPTURE OF THE BALTIC ISLANDS. Part II. Lieut.Colonel Green, and Captain Lanham
- (6) A NEW FLASH-SOUND FIRER. Dimitr Ramadanoff
- (7) BIGGER AND BETTER THAN EVER. By the author of "Shine on Me"
- (8) WARFARE IN THE 18TH CENTURY. (IV) Lieut.Colonel Scammell
- (9) INFANTRY VS. TANKS. Sergeant Bull
- (10) THE MACHINE-GUN PROBLEM. Lieut.Colonel Burne
- (11) SELECTING THE ADVANCED COURSE STUDENT. Major Pearson
- (12) CURVES AND FAST BALLS AT LEAVENWORTH. Major Cooke

JOURNAL OF THE ROYAL ARMY MEDICAL CORPS

(Great Britain)

August 1936

- (1) THE AMMONIA-CHLORINE TREATMENT OF WATER. Major Elliott
- (2) ROYAL SOCIETY OF MEDICINE UNITED SERVICES SECTION WITH SECTION OF PSYCHIATRY. DISCUSSION ON FUNCTIONAL NERVOUS DISEASE IN THE FIGHTING SERVICES
- (3) WAR EXPERIENCES OF A TERRITORIAL MEDICAL OFFICER. Major-General Luce

September 1936

- (4) WAR EXPERIENCES OF A TERRITORIAL MEDICAL OFFICER. Major-General Luce

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- (5) DESCRIPTION OF AN X-RAY COUCH, DESIGNED FOR USE ON FIELD SERVICE, INCORPORATING A NEW TYPE OF LOCALIZING DEVICE. Major Yorke
- (6) WAR EXPERIENCES OF A TERRITORIAL MEDICAL OFFICER. Major-General Luce

JOURNAL OF THE ROYAL ARTILLERY (Great Britain)

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- (1) INDOOR TACTICAL INSTRUCTION. Lieut.-Colonel Haskard
- (2) THE FRENCH GUNS AT BERTRIX, 1914. Lieut.-Colonel Burne

Periodical Articles—Catalog

- (3) THE ART OF MILITARY WRITING. By "Anon"
- (4) THE FORMATION OF THE FIRST BRIGADE OF THE INDIAN REGIMENT OF ARTILLERY. By "Anon"
- (5) THE SIEGE OF MALTA. Captain Davey

JOURNAL OF THE ROYAL UNITED SERVICE INSTITUTION
(Great Britain)

August 1936

- (1) THE DEVELOPMENT OF CIVIL AVIATION. Lieut.-Colonel Shelmerdine
- (2) AIR DEFENCE OF OUR SEA COMMUNICATIONS. By "Securus"
- (3) THE FRENCH CAMPAIGN IN MOROCCO. Vice-Admiral Osborne
- (4) THE CAPTURE OF TSINGTAO. Brigadier Nosworthy
- (5) AIRCRAFT ATTACKS AGAINST WARSHIPS. A REPLY. By "Solver"
- (6) THE ARMY OF TO-DAY. Lieut.-Colonel Armstrong
- (7) THE DEVELOPMENT OF THE AIRCRAFT CATAPULT. Harper
- (8) THE NEW LEADERSHIP. Major Noakes
- (9) THE REBIRTH OF THE GERMAN ARMY
- (10) THE SECOND LONDON NAVAL TREATY
- (11) BRITISH POLICY REGARDING RETENTION OF CRUISERS AND DESTROYERS
- (12) THE AFTERMATH OF THE ITALIAN CONQUEST OF ABYSSINIA
- (13) DANZIG. Major Reynolds
- (14) THE AUSTRO-GERMAN AGREEMENT
- (15) THE NEW DARDANELLES CONVENTION

JOURNAL OF THE ROYAL UNITED SERVICE INSTITUTION
OF INDIA (Great Britain—India)

July 1936

- (1) A RETROSPECT: 1920-1935. Major Minchin
- (2) OPENING OF HOSTILITIES IN THE RUSSIAN-JAPANESE WAR WITH COMMENTS ON THE BATTLE OF THE RIVER YALU, 30TH APRIL-1ST MAY 1904. Colonel Kearsey
- (3) THE PROTECTION OF TANKS IN BATTLE. Captain Richards
- (4) THIS NEXT WAR BUSINESS. By "Mouse"

MARINE CORPS GAZETTE

August 1936

- (1) REENACTMENT OF THE BATTLE OF MANASSAS
- (2) ANTI-AIRCRAFT NOTES. Major Pepper
- (3) A STUDY OF MARINE CORPS INFANTRY WEAPONS. Corporal Catron
- (4) USE OF CHEMICAL AGENTS IN GUERRILLA WARFARE. Lieutenant Denig, Jr.

MILITARWISSENSCHAFTLICHE MITTEILUNGEN (Austria)

By Major F. Düring, Infantry

April 1936

- (1) LUFTRÄUME UND IHR EINFLUSS AUF DIE WEHRLAGE DER STAATEN. [Air spaces and their influence on the defense of nations.] Major General v. Pitreich

- (2) WIRTSCHAFTSSTRATEGIE. [Economic strategy.] (I) Lieutenant Handel-Mazzetti

The author discusses economic sanctions and proves by historical examples that sanctions were imposed during the Napoleonic Wars, American Civil War, and others.

- (3) FRANZÖSISCHE GEDANKEN ÜBER DEN LUFTKRIEG. [French views of a war in the air.]

A review of the book, "L'avion tuera la guerre," by Pierre Faure.

- (4) DIE WICHTIGSTEN MANÖVER 1935. [The important maneuver of 1935.] Field Marshal Schafer

The author discusses maneuvers held in 1935 in Austria and her neighboring states, in France, Great Britain and Russia, and in the United States, and concludes that all states employed motorized troops, and combined action between ground troops with aviation. Smoke was used to a large extent, which, while it decreased the fire effect of the opposing side by 50%, interfered considerably with the movement of motorized troops.

(5) DER KRIEG IN OSTAFRIKA. [The war in Ethiopia.] (I) Captain Kachina

The battles of Enderta, Tembien, and Schire are discussed in this instalment.

(6) DER SOMMER DES KRIEGSJAHRES 1917. [The summer of 1917.] Colonel v.Dragoni

A review of Volume VI of the Austrian official history of the War.

May 1936

(7) VOR ZWANZIG JAHREN: DER KRIEG GEGEN SERBIEN 1914/15. [Twenty years ago: The War against Serbia.] (I) Colonel v.Wittich

(8) WIRTSCHAFTSSTRATEGIE. [Economic strategy.] (II) Lieutenant Handel-Mazzetti

In this instalment, the author concludes that if a nation prepares economically for a war, it will be able to successfully wage such a war, or what is more important, it will be able to prevent a war.

(9) DIE LONDONER FLOTTENKONFERENZ. [The London Naval Conference.] Captain Sokol

June 1936

(10) VOR ZWANZIG JAHREN: DER KRIEG GEGEN SERBIEN 1914/15. [Twenty years ago: The War against Serbia.] (II) Colonel v.Wittich

(11) PREISSCHRIFT: ZUSAMMENWIRKEN DER INFANTERIE UND ARTILLERIE IM NEUZEITLICHEN BEWEGUNGSKAMPF. [Cooperation between infantry and artillery in a war of movement.] Major Zuber

Major Zuber emphasizes in this article that cooperation between infantry and artillery is far more necessary in a war of movement than it was in stabilized warfare. In order to prevent artillery from firing on friendly troops, which is not at all impossible in a fast-moving situation, the artillery must know at all times the exact location of the most advanced troops. The author has prepared a system of signals to be displayed by the front line, which will give the artillery all the information necessary for an ideal cooperation. This display of signals, however, necessitates that artillery observers keep the front line under close and constant observation. In a war of movement the situation may change considerably between the time artillery fire is asked for by the infantry and the delivery of this fire and danger of firing into friendly troops exists to a great extent.

(12) DAS TSCHESCHOSLOWAKISCHE "STAATSVERTeidIGUNGSGESETZ." [The national defense act of Czechoslovakia.] Field Marshal Schafer

(13) DER KRIEG IN OSTAFRIKA. [The War in Ethiopia.] (II) Captain Kaschina

(14) ERFAHRUNGEN AUS KOLONIALKÄMPFEN. [Experiences from colonial wars.] Major v.Frauenholz

MILITAR-WOCHENBLATT (Germany)

By Major G.J. Braur, Infantry

25 May 1936

(1) AUS GROSZER ZEIT VOR ZWANZIG JAHREN. SCHLACHTENERFOLG UND SCHLACHTENGLÜCK. [Twenty years ago. Success and luck in battle. An observation of 31 May 1916.] Lieut.Commander Scheibe, Retired

A revival of the old controversy of the naval battle of Skagerrak, 31 May 1916. In this article the author counters the British assertions that it was luck that favored the Germans in that battle. He covers the various opportunities which presented themselves to both sides during the progress of the battle and shows how the British or the Germans made use of them or failed to use them. He credits the Germans with the willingness to take

the risks which the British hesitated to do. Initial formations, time of day, and weather conditions are also considered by the author.

(2) GEDANKEN ÜBER DIE AUSWAHL EINER VERTEIDIGUNGSSTELLUNG. [Selection of defensive positions.]

According to the author the most important part of a defensive position is its main battlefield—viz., the zone in which the defensive facilities are located. As a rule, the main line of resistance is selected in relation to the artillery positions. This always leads to the conclusion that the artillery constituted the principal supporting weapon. In recent military periodicals the heavy machine gun is credited as being the most dangerous weapon opposing an attacking force, and the backbone of the defense. Much space is devoted to the problem of selecting the best method of progressing past this weapon. Some periodicals state: Locate the main line of resistance in such a manner as to afford the maximum effective fire for the heavy machine guns.

The author then goes into detail in the technique of the location of the main line of resistance and the heavy machine guns therein. He also comments in detail on the functions of the artillery in this scheme. The most dangerous threat to the heavy machine gun is the tank; therefore the main line of resistance must include the selection of terrain unsuitable to tanks whenever this is possible.

(3) ARTILLERIE IN DER VORHUT ODER NICHT? [Shall there be artillery in the advance guard?] Major Matting

In the 11 April 1936 issue of the "Militär-Wochenblatt" (see Quarterly No. 62, page 118), an article appeared advocating the use of artillery in the advance guard of a reinforced infantry regiment. It is true that the initial advantage in a meeting engagement is with the opponent who is able to deliver the first effective fire. This, the author states, does not dictate that a reinforced infantry regiment must have artillery attached to its advance guard. The regiment is organically equipped to deliver this fire, having the light minenwerfer as the infantry weapon designed for this function. Its dispersion is less and the accuracy greater than the artillery, and can fire from practically any position. It is more mobile and less visible than a horse-drawn battery of artillery.

The author further comments on the folly of endangering the artillery in the event of a surprise engagement when it can quickly be brought forward should it be needed.

(4) VERLASTBARE TRUPPEN. [Motorized troops.] Brandt

Motorized troops are dependent on trucks to supply their needs and require less trucks and supplies than foot troops. Their combat strength and armament must be equal to that of the marching infantry. The differences lie in the transportation equipment from the combat vehicles to the light trains. Former motorized troops required about 50% of attached motor vehicles to take care of the most important carts, wagons and horses. The unnatural method of transportation by other transportation agencies must cease. These requirements must be met by having trucks or trailers for all combat and supply vehicles. The trucks, though, required for troop transportation, must belong to the transportation troops and not to the motorized troops and will be attached to them from time to time as required.

Organically, motorized troops should have only the absolute minimum in trucks. The battalion, for example, should have only 2 or 3 light trucks for the transportation of packs, rations, and ammunition. These trucks should be augmented by spring equipped, 2-wheel trailer utility carts. Likewise the minenwerfer (mortar) and the antitank gun should be on spring-equipped and rubber-tired chassis. This will enable the easy handling of carts and heavier infantry weapons. When the troops move on foot the carts and weapons are moved by horse-drawn caissons. When motorized, these weapons are trailed behind the trucks. Upon detrucking the weapons are manhandled until the horse echelon catches up. Under some conditions locally requisitioned horses can be utilized or drawn from remount depots.

The large field (rolling) kitchens can be replaced by two smaller rolling kitchens that can be coupled to the ration carts.

The machine gun company now has two carts each capable of carrying one heavy machine gun and 4,000 rounds ammunition. The wagons used

formerly by the minenwerfer and antitank companies are replaced by two-trailer carts each.

The artillery of motorized troops should organically be motorized. If the artillery is only partially motorized then loading ramps are necessary provided the guns are not on spring chassis with rubber tires. Observation, communication, and munition wagons must be replaced by carts.

The motorized cavalry must have more cycle troops than mounted troops in order to secure faster reconnaissance and messengers. These do not take as much truck space as required for riflemen.

When a motorized division moves, all space on the vehicles is for personnel; all combat vehicles, carts, kitchens, and weapons are trailed behind the trucks. The horse echelon of mounted men, lead animals, caissons, etc., due to the light equipment can cover about 31 miles per day, and in a few days can overtake the detrucked troops.

The detrucked motorized troops are not as mobile as animal-drawn units. But the motorized troops are more mobile and constitute a greater combat threat than the old infantry organization.

The great advantage of motorized troops is that an army commander can move twice as many troops to a decisive location as heretofore.

The author recommends that the European situation calls for the present standing army and some reserves to be motorized. If new vehicles are required he hopes that they should not be patterned along the lines of those of yesterday but as required in the future.

(5) LUFTKRIEGSERFAHRUNGEN IN ABESSINIEN. [Lessons from the war in the air in Ethiopia.] Colonel Nagel, Retired

The author states that the air arm was mentioned daily in the Italian dispatches. It is true that the Italians had air superiority, having no hostile resistance to contend with, but geographic and climatic conditions offered difficulties. For example, the rarified air made the take-off with a fuel and bomb load extremely hazardous. High velocity, winds, clouds, atoms and fog could all be encountered on a single flight.

Observation and location of objectives was difficult from high altitudes; therefore pilots were compelled to fly as low as 100 feet in order to distinguish their targets. This made the pilot very vulnerable to ground fire and in most cases was constantly under fire from ground troops. Speed and skill were his best protection.

The Italians developed innumerable emergency landing fields at high altitudes and various other altitudes behind their lines to assist those pilots whose motors were hit and especially in triple motor planes they were unable to climb on their return flight.

4 June 1936

(6) EINIGES NEUE ZUM HANDSTREICH AUF LÜTTICH 1914. [New data on the surprise attack on Liege in 1914.] Lieut. General Kabish, Retired

An interesting article in which the author presents new data on the German surprise attack on Liege in 1914. From General de Selliers de Moranville of the Belgian Army he learned that the Belgians had received early information of the Austrian ultimatum to Serbia and that the Governor immediately prepared fortifications between the forts about Liege. The 6000-man garrison, plus 3000 militia, confronted 32,000 Germans a few days later and were able to delay these overwhelming forces. The author shows that the Schlieffen idea of continuous attack along the entire front will eventually create an opening necessary for the decisive blow. This was demonstrated here. The most important lesson of this attack is that whoever desires to surprise his opponent must take care not to be surprised himself.

(7) "DER MARSCH DES EISERNEN WILLENS." [The march of an iron will.] (Conclusion of the Italo-Ethiopian articles)

A narration of General Badoglio's forced march on Addis Ababa. This was made by three columns on two roads starting 20 April 1936. The first column consisted of entrucked troops, motorized artillery and special engineer troops moving on the Emperor's road from Dessie toward Addis Ababa, via Makfud—Debra Brehan, a distance of 248 miles. Another

column moved via the Dessie—Worra Jlu—Egersa road approximately 192 miles, and the third column with artillery on mules traveled over the Emperor's road. A total of 10,000 Italians and 10,000 Eritreans, 11 batteries artillery, one squadron reconnaissance cars, and 1,600 trucks took part. The author describes the difficulties encountered, such as lack of bridges, blocked roads, turns too acute for trucks, rain, swamps, altitude, etc. Only the driving power of General Badaglio's iron will carried the troops over these difficulties to ultimate and early victory.

(8) FEUERPLÄNE. [Schemes of fire.] Lieut. General Boltze, Retired

Using the German field service regulations as his basis, the author comments on the coordination of fire of the various weapons in defense and attack. He emphasizes the need of organization in depth, especially the artillery and heavier infantry weapons. These schemes are based on three premises in the attack: (a) Where fire preparation precedes the infantry advance; (b) Where the infantry advance and artillery fire start simultaneously; (c) Where the infantry advances and receives artillery and heavy infantry weapon support on dangerous localities when requested. This method is used in surprise attacks.

(9) PIONIERE IM PANZERVERBAND. [Engineers with armored units.]

An extremely interesting discussion of the user of engineers as part of tank, motorized and mechanized units as large as brigades and divisions. Since the characteristics of these units call for speed, naturally all work done by the engineers must call for speed in operation. For this reason they would carry great quantities of explosives for demolitions, power saws, cables with hooks, etc., in addition to the average entrenching equipment. The reduction of steep slopes of trenches or gullies to passable grades, the construction of bridges by use of pneumatic pontoons for small streams, removal of barriers, road blocks, wire entanglements, mine fields and road repair, all become part of their functions. The author recommends that the commander of the engineers or an engineer be on the staff to advise the commanders.

(10) HABEN WIR BEIM EINTRITT IN DAS GEFECHT NOCH EINE EINHEITSGRUPPE? [Does the combat team still exist when the actual attack starts?]

The author describes how it is impossible to retain integral units up to the time the attack begins. He illustrates his point by calling attention to the initial subdivisions such as advance guard, support, reserve main body, etc., and then shows how the advance guard units in turn are broken up until a commander finds his unit scattered over wide terrain. Discussing the shortage in leaders, he states that it is unfair to compare the conditions of 1914 with the present. In 1914 he states that the squad leader and even the platoon leaders were permitted no initiative, that not only were they told the "what" but also the "how" to perform their duties. He states this is not a reflection on the leaders but the tactical conception of the time. The author says that it would be an error to revert to these old concepts because of a dearth of leaders at present.

The war demonstrated that the actual fighting was done by individual soldiers and that every effort must be made to inculcate in them the highest morale and tactical understanding of their grades.

(11) PANZERABWEHR BEI MOTORISIERTEN EINHEITEN. [Antitank defense of motorized units.]

A short discussion of the lack of protection of motorized columns on the march when the antitank weapons are hauled behind trucks. The author endeavors to show how helpless the vehicles are against the attack of a scout car. Remedial measures, according to the author, consist of warning service to prevent surprise and the use of antitank weapons on self-propelled mounts having 360° fire radius. He advocates fast half-track vehicles for the mounts of these weapons.

11 June 1936

(12) DAS RINGEN UM DEN ENTSCHLUSZ. EIN BEITRAG ZUR HEBUNG DES VERSTÄNDNISSES FÜR DIE HÖHERE TRUPPENFÜHRUNG. [The difficulty of making a decision. A memorandum to clarify the opinions of the senior commanders.] Colonel v. Mantey, Retired

A revival of the debatable question as to whether von Moltke used correct judgment in altering the 1905 Schlieffen plan for the concentration and operations of the German armies at the outset of the World War. Quotations by General von Ludendorff are offered as a defense for the Moltke decision. Attention is invited to the changes in the military and political situation in 1914 from that which existed in 1905. No definite conclusions are offered.

(13) KÖRPERLICHE UND SEELISCHE BEANSPRUCHUNG DES TANKSOLDATEN. [Physical and moral requirements of a tank soldier.] Brandt

The author calls attention to the great physical strain upon tank personnel in combat. He is of the opinion that in actual combat the physical endurance of the crew will be exhausted long before the fuel supply. He describes the terrific noise within the vehicle when the lids are closed, caused by the motor, the firing, traction, etc., amplified by the metal acoustics. The effect of this on the ears is a great strain. The fumes due to the gas combustion, brake bands, hot and burned oil, powder, etc., in addition to the eccentric movement of the vehicle, has a detrimental effect on the stomach. The severe jostling and crashing against the metal walls, due to the vehicle's changing direction in its effort to select terrain, offers a real problem. Crash helmets and protective clothing add to the distress of the occupant due to the intense heat. Although in peace time many vehicles can travel 40 miles per hour in maneuvers, this does not mean they can do the same in combat when the above conditions exist. He states that 15 miles per hour will approximate the speed under those conditions. He urges a full-speed test trial for those who are skeptical.

The author feels that if the modern tank plus the crew can accomplish in war one-half of what is proclaimed as its accomplishment in peace, it has rendered excellent service. He believes there is a grave danger in over-estimation of capabilities of a weapon.

(14) DIE ZUKUNFT DER ARTILLERIE. [The future of artillery.]

No one knows what form the next war will take, although there are many prophets who claim to know and are quite positive in their assertions. Air enthusiasts believe that the decisive battles will be fought in the air but up to the present they have been unable to convince the responsible authorities that armies are unnecessary. The author acknowledges the incalculable value of the air service and tanks in future wars but reminds us that weapons have kept abreast of these improvements. He believes there is as great a possibility today of position warfare as in the World War.

He is of the opinion that tanks have not relegated the infantryman to oblivion as tank theorists believe. He feels that just as the infantry needed artillery to blaze the way, so does the tank need the artillery. He then discusses the mobility needs of artillery for future warfare, especially of heavy calibers which can be moved rapidly forward to subdue the antitank defenses. The author states that it was not due to the tanks that open warfare was made possible in 1918 because the Germans had great successes without them. He states this was made possible by the artillery superiority and that the same condition prevails today as then, also that efficient heavy long-range artillery will be the essential need.

(15) BEFEHLSVERHÄLTNISSE DER FRANZÖSISCHEN LUFTMACHT. [Command conditions of the French air force.]

An important new French regulation relative to the senior air command went into effect 1 April 1936, which is of great significance to the French Army. The chief of staff of the air arm became, in addition to his duties, the chairman of the air advisory committee and shares with the chief of staff of the army the responsibility of the air service in war. He also becomes inspector general of the air force. The author goes into the details of his new assignment and duties as well as those of the other general officers of the air force.

(16) FLUGABWEHRARTILLERIE (FLAK). [Antiaircraft artillery.] Colonel Nagel, Retired

An article discussing the possibilities of antiaircraft artillery against modern aviation in which the author disagrees with the air advocates who claim that due to their great speed and high altitude flying that antiair-

craft firing is ineffective. He believes that even if this is all that is accomplished it is worth while because the aviator has less time for observation, bombing becomes more erratic and objectives missed. He then presents data showing the improvements of antiaircraft artillery, and the hits made at various altitudes and speeds.

(17) TECHNISCHER RUNDBLICK. [Technical review.] Colonel Blümner, Retired

A brief review of some of the recent experiments and tests relative to machine guns (increase of rate of fire), use of concentrated light rays as a lethal weapon, and use of the infra-red detector.

18 June 1936

(18) MASCHINGENGEWEHR-BATAILLONE. (EINE KRIEGSERFAHRUNG.) [Machine gun battalions. A war experience.]

An excellent account of the employment of the American 7th Machine Gun Battalion of the 3d Division at Chateau Thierry, 24 May 1918.

(19) LUFTANGRIFFE AUF EISENBAHNEN. [Air attacks on railroads.] Major Kretzschmann, Retired

The author gives several historical examples of air attacks on rail centers such as the attack on Valenciennes, 26 September 1915, when an ammunition train was blown up, causing disruption of supplies, etc. He also describes the attack on the railroad bridge along the Saloniki—Adrianopol line where the damage caused a train of 14 cars to be wrecked. This delay caused a critical supply situation to the Bulgarians. The author states that the material damage to the railroads by aircraft was negligible at the end of the war. The real damage was the disruption of communications, telegraph, etc., and supply just prior to an impending attack.

The remarkable expansion of aviation since the War will present a different picture in future wars. The modern technical appliances will permit destructive bombing of rail nets interrupting supply and troop movements on a large scale. These attacks will be synchronized with bombing of the principal highways. The bombing of bridges is difficult from high altitudes because of the narrowness of the target as well as the antiaircraft defense at these and other important locations.

The author states that in the cause of national defense it would be to the advantage of a country to tunnel underneath difficult streams, especially where large span bridges are necessary. The damage to this type bridge might require weeks to repair and cripple all traffic in the meantime.

The author describes such targets as long stretches of railroads which can be bombed from low altitudes, tunnel entrances, viaducts, railroad cuts where slides can add to the delay in repair, etc.

Because of the speed in which the damage to tracks or stations can be repaired, it will be necessary to intermittently bomb these facilities to maintain the desired disruption. Careful planning to assure the disruption of circuitous lines as well as main lines is imperative if the crippling of transportation in a certain area is desired.

(20) ZUR FRAGE DER AUSBILDUNG VON RESERVEOFFIZIEREN. [The problem of training reserve officers.] Colonel v. Nippold, Retired

(21) HEERESMOTORISIERUNG. [Motorization of the army.]

The author calls attention to the assertion that no real lessons were derived from the employment of tanks in the World War because the Allies possessed a preponderance of tanks and the Germans lacked antitank weapons. He also recalls General Debeney's statements as commander of the French First Army, that in 1918 his cavalry had the opportunity to be employed in pursuit but failed to get up in time. He declared that trucks with machine guns could have accomplished this mission, had they been available. At Montdidier he had an opportunity to use machine guns carried on trucks with very satisfactory results even though the trucks were not of the cross-country type.

General Debeney is of the opinion that it is far better to have two light divisions (motorized), of three regiments each, than one division of six regiments. He advocates just enough infantry for these divisions as are required for the security of the bivouacks.

General Debeney warns against too much speed in motorized units. He advocates their use for the rapid closing of a gap or for pursuit. In discussing the use of tanks he states that it would be erroneous to recklessly use massed tank action at the outbreak of the war for fear that they would be used up and it would require too much time before industry could replace them. It would be better at the outset of the war to assign all small tanks and available antitank weapons to the infantry divisions and the medium and heavy tanks to the general reserve.

The author explains the differences in opinion between the two leading French authorities, General Debeney and Colonel de Gaulle (the latter is a confidant of Marshal Petain), on the use of motorized units. De Gaulle advocates an advance across the Rhine, penetrating the Upper Danube. Debeney warns against such reckless ventures but offers no substitute plan.

Debeney does favor the use of tank and mechanized forces in the sphere of the "armée de couverture," giving them more of a strategic defensive mission. His ideas are conservative, workable, and given great credence in France and elsewhere. The General also believes that modern antitank weapons and well organized barrier constructing units will materially slow up an advance of motorized and mechanized units, especially where an open flank is lacking.

It would be a worth-while task if someone would figure out in concrete terms the supplies required for a modern army with its 10,000 trucks and motorized vehicles with its fuel requirements and method of supply.

(22) DER ANTEIL DER ITALIENISCHEN MARINE AM KRIEGE GEGEN ABESSINIEN. [The participation of the Italian navy in the Italo-Ethiopian War.] Captain v. Waldeyer-Hartz, German Navy, Retired

The Italo-Ethiopian campaign took on all the aspects of an overseas operation with the exception that Ethiopia possessed neither a coast line nor a fleet. Although the naval operations were unhampered in their mission of troop convoy, their transports were put to a hard test in this overseas enterprise.

The outstanding accomplishments of the navy were: (a) The alterations of commercial vessels, converting them into transports. Ninety of these ships were converted into transports in one month. (b) The preparation and organization of harbor facilities for unloading and evacuation of all expedition supplies. (c) Maintenance of the communication service, wireless, etc. The radio handled 1,929,500 words in messages during the month of December 1935. At present the navy maintains 50 radio stations handling 6,000,000 words per month. Radio telephone facilities have also been established. (d) The accommodation and evacuation of sick and wounded in hospital ships.

In addition to all these various accomplishments it had to contend with the delicate situations created by the British threat through the League. The Italian strategic moves in Libia, Red Sea, and the Mediterranean Sea prevented the open break which might have led to hostilities.

(23) FLIEGERSICHT UND BAUEN. [Aerial visibility and construction work.] Captain Ruprecht, Retired

The author states that the experience of the World War demonstrated that a war can be lost due to the lack of food and raw materials. Nations are striving to become self-sustaining. Agriculture and industry are expanded, and whenever items are lacking in that they cannot be produced in that country, then enormous supplies are laid up for war emergencies.

France almost lost the war due to the oil shortage, therefore has established a supply to maintain her needs for three years. Underground tanks had to be constructed as protection against fire and air attacks. The future may reveal that municipal facilities, such as gas, water, and electricity, must be protected in a similar manner.

The location of all these facilities naturally will be known to the enemy, due to peace-time espionage, but they can be protected by carefully locating them so that no outstanding landmarks are nearby to assist the aviation or artillery observer to definitely locate the site. A tank 500 yards from a road intersection is harder to locate from the air than one 20 yards from the intersection. Natural terrain features are the best protection.

(24) FRANZÖSISCHE KOLONIALEKRIEGSMETHODEN. [Colonial warfare methods of the French.] Hofweber

An excellent article describing the selection and training of personnel for work with colonial people.

(25) DIE RUSSISCHE AUSBILDUNGSVORSCHRIFT FÜR DIE INFANTERIE. [The Russian training manual for infantry.]

The new Russian infantry training manual for 1934 is a revision of the old 1928 manual. The inclusion of the combat team is most important of all the changes and additions.

Generally the manual covers three divisions: I—Close order training for individual, squad, platoon, company, battalion, and regiment. II—Combat training. III—Heavy machine-gun units.

Such subjects as snowshoeing, hand-to-hand combat, bayonet training, grenade throwing, and bicycle formations have been omitted and are included in special pamphlets. Gas and antigas instruction has been materially expanded in the text.

The combat team is termed a rifle team in the text and is composed of a leader and 8 men with a light machine gun. It is formed much like the old German light machine-gun squad. The rifle platoon is composed of 3 "rifle teams" and a grenadier squad which is composed of a leader and 6 men, divided so that 2 men serve each of the 3 mortars. The rifle grenades are fired from rifles equipped with prong supports.

The rifle company is independent of the support of weapons from higher units as it has 2 heavy machine guns. It also possesses 3 combat vehicles in addition to its 3 platoons.

The author describes the close order formations and types of marching steps. In extended order in skirmishes and squad columns the distances and intervals are 4 to 5 paces between men.

The heavy machine-gun squad consists of a leader and 8 men (gunner, assistant gunner, range finder, observer, driver, and 3 ammunition carriers).

(26) AUF DEM WEGE ZUM BOGENSCHUSS BEI DER INFANTERIE. [Progress in the high angle fire for infantry.] Däniker

An article describing the new Italian mortar which fires projectiles the weight of a hand grenade, either as a high angle or flat trajectory weapon, by regulating gas vents which regulate its initial velocity. Its maximum range as a mortar is 500 yards and on firing emits a loud detonation with considerable flame and dense smoke. The fragmentation radius is about 15 to 20 yards and the weapon must be realigned after every shot which makes its rate of fire about 8 to 10 shots per minute, or 25 to 30 shots per minute without realignment.

The mortar with its tripod can be carried by one man on the shoulders and the gun squad carries by hand 25-30 rounds. Normally, the mortar is carried on a pack mule. The first mule carries the mortar and 2 boxes of ammunition; the second mule carries 3 boxes ammunition, making 125 to 130 rounds total.

This new weapon is of great significance, especially to solve that "blue zone" just prior to contact with the enemy and in light of antitank defense.

(27) DER OFFIZIER UND DIE LEIBESÜBUNGEN. [The officer and physical training.]

An article advocating instruction and participation of officers in physical training.

25 June 1936

(28) ARTILLERIE IN DER VORHUT? [Should artillery be in the advance guard?]

The author discusses the debatable question of the advisability of artillery in the advance guard and declares himself in favor of it. He then gives what he considers the best location in the advance guard for the battery commander and the battery, and discusses the time required to get it into action. He also offers a schematic chart of distances between elements of advance guards for a reinforced infantry regiment and the division.

(29) WEGE UND IRRWEGE UM DIE PANZERABWEHR. [Correct and incorrect methods of antitank defense.]

This article is a continuation of a previous article under the same title which appeared in the 18 May 1936 issue of the "Militar-Wochenblatt" (see Quarterly No. 62, page 125). In the present article the author discusses the attack strength of the tank and of the infantry. He elaborates on the progress as to speed and fire-power which has carried the tank from the status of an auxiliary infantry weapon to a special arm which combines certain characteristics of the infantry, cavalry, and artillery. Its new speed, which carries it faster than the infantry it is to support, has created a problem of how best to utilize this speed and still assist the infantry. The question of mass employment of tanks on a broad front is discussed by the author as is their employment in smaller numbers.

The author states that no one contemplates using tanks as a mobile independent force for a breakthrough where the enemy is equipped for antitank defense. On the contrary, they are used for envelopment, exploitation, and pursuit, to create the decisive blow.

In his discussion of the use of the tank as a breakthrough weapon in the assault, he gives their mission as that of neutralizing the hostile machine-gun and artillery fire coming from the center and rear of the zone when its own infantry is engaged on the main battle zone. To do this it must act as a powerful special weapon independently and not as an infantry auxiliary weapon in the sphere of the division or corps. When used to bring on a decision then they are to be massed at the decisive point and become the principal or major weapon and the others the supporting weapons.

This revives the debatable question that when used individually as auxiliary weapons their combat effect is questionable and they cannot force a decision. In opening or meeting engagements such as occur with advance guards against weak but determined resistance they could be used in small groups. But here the infantry must follow up quickly. In the defense also small groups may be used provided that they are not needed elsewhere where a decision is sought.

It is best to concentrate or combine tanks into large units for united action at decisive points and as the occasion arises from time to time attach the necessary tanks to the infantry for assistance. The author condemns the method of assigning definite sectors in depth and breadth, the schematic advance, for the attack of tanks. He feels that enemy organization, terrain, mission, and combat situation should determine the method of employment, together with the cooperation of the infantry, artillery, and tanks themselves. In this he mentions attacks with and without artillery support, surprises, envelopments, partial and mass attacks.

This necessitates powerful antitank defense in the infantry division in addition to the tanks for the attack and defense. Here the author discusses the efforts to construct a weapon to be used against machine guns and tanks and how the distinctly different types of fire required forced the adoption of the *minenwerfer* (trench mortar) and the *howitzer*.

The author comments on antitank weapons stating that their main defensive position should be between the main line of resistance and the most important artillery observation posts. A reasonable number should be in front of the front line, checkerboarded in depth in such a manner that each weapon is protected by cross fire from the rear.

An attack without tank support will progress slowly and would require forward displacement by the leap-frog method. No definite summation is made by the author who apparently will continue the article at a later period.

(30) DIE UNTERWERFUNG ABESSINIENS. [The subjugation of Ethiopia.] Colonel v. Xylander, Retired

This is part of a series of articles on the Italian operations in Ethiopia which have appeared in previous issues of this magazine. In this article the author discusses the Harrar operations by General Graziani's Italian troops in May 1936, and the mopping up operations after that date.

(31) ÜBUNG IN SOMMERLICH BEWACHSENEM GELÄNDE. [The use of terrain in summer.]

The author states that in most wars the decisive battles have been fought during the summer months and that it is during these months that most maneuvers and terrain exercises are conducted. He states that many

times carefully prepared problems do not give the real picture because the height of vegetation obscures observation, cuts down field of fire and mobility. These facts, the author stresses, often are not considered in the preparation of problems or by judges in these exercises.

4 July 1936

(32) DER ARTILLERISTISCHE "SCHWERPUNKT" BEIM ANGRIFF. [The principal effort of artillery in an attack.] Lieut. General Marx, Retired

The above title is not entirely correct because there is no true artillery principal effort but a tactical effort. The artillery efforts are its cooperation with the infantry efforts. Sometimes more artillery is used at a point of the secondary infantry effort and this helps deceive the enemy, giving him the wrong picture of the infantry plan and location of its principal effort. The author offers historical examples to illustrate his assertions such as the German action of 24 January 1917, where the Russians had overrun their positions. Two divisions and ample artillery were designated to recapture the ground. The first attempt failed because the enemy still possessed considerable artillery at the breakthrough point. At the second attempt it was decided to split the artillery fire by placing considerable fire at a point where an attack was not contemplated and on the site of the principal effort. This deceived the Russians who immediately split not only their artillery but also their infantry forces to meet this new threat. The second German attack at the breakthrough site succeeded.

The author also cites a repetition of these tactics in the Argonne in 1915 at Fille Morte by the German 33d Division and the use of the German artillery at the Chemin des Dames. He also discusses the situation in which an infantry unit progresses more rapidly behind its barrage than its neighbors and decides to move laterally to assist these neighboring units by striking the enemy in the flanks or rear. He leaves you with the question of how best to solve the artillery problem for assisting this advanced unit in its efforts to the flanks.

(33) DIE FRANZÖSISCHE FESTUNGSFRONT BELFORT—VERDUN. IHRE EINWIRKUNG AUF DIE OPERATIONEN 1914 IM WESTEN. [The French line of fortresses, Belfort—Verdun. Its influence on the 1914 operations on the Western Front.] Major General Klingbeil

The author describes the double screen of fortresses and outpost forts, between Belfort and Verdun showing how these were constructed to protect the French right flank. These fortresses influenced the French and German operation and concentration plan for 30 years. Even Count von Schlieffen declared them impenetrable since they could only be flanked from the north. The article shows how the 23d Infantry and two French cavalry divisions at Nancy were able to utilize this fortress line and contain the 26th Infantry and two German cavalry divisions.

These fortresses served as a screen and cover for the concentration of the French Army and as debouching points for offensive operations or delaying points during a withdrawal. Utilizing these fortresses and their excellent rail net, the French were able to withdraw considerable forces for use at the hard-pressed Marne sector at Paris where the principal German effort was taking place while comparatively few troops were able to contain large German forces along the Belfort—Verdun line.

(34) DER TAKTISCHE EINSATZ DER FLAK-VERBÄNDE. (RUSSISCHE UND FRANZÖSISCHE ANSICHTEN.) [Tactical employment of antiaircraft units. (Russian and French sources.)] Colonel Nagel, Retired

An article in which the author gives the sizes of areas which an antiaircraft battalion of three batteries can cover only the route of march. He aptly describes the method of employment of these guns plus their antiaircraft machine guns to protect a line of march, and lines of communication. He also covers their employment in the attack and defense in coordination with and without friendly aviation. Methods of emplacing the guns in mountainous terrain to assure surprise use of alternate positions, visibility, etc., are also discussed.

(35) DER KAMPFWERT EINES FRANZÖSISCHEN BATAILLONS. [The combat value of a French battalion.]

An examination of the French battalion reveals that it is composed of three rifle and one machine-gun companies. Even though the organization is similar to that of the Germans, its fire-power is greater. The attacking squad (composed of 1 noncommissioned officer, 1 private 1st class, 1 light machine-gun group of 5 men, 1 rifle group of 4 men and 1 rifle grenadier) has a frontage of 31 yards, the platoon (3 squads) has a frontage of 62 yards, and the company (4 platoons) 186 yards. When employed against a fortified position the breadth of a company is but 124 yards. The usual depth of an attacking company is about 250 yards. The maximum frontage of an attacking battalion is 435 yards and when employed against a fortified position, 310 yards. In the defense the battalion frontage is 620 yards. The French regulations differentiate between the forced and voluntary withdrawals.

In the attack the French use two companies in a front line 435 yards in width, and is able to employ 45 light machine guns in the attack. Each company has 16 rifle grenadiers.

The company has three reserve light machine guns on the ration and baggage wagon. It can be assumed that a company would utilize these in the defense.

The author states that the heavy machine gun is the bulwark of the battalion fire-power and points out that the battalion possesses the tremendous fire-power of a total of 61 machine guns, the regiment 183, as compared with 117 of the German regiment.

When in action the fire-power of the battalion is augmented by that of one attached platoon of the howitzer company. The author also states that it is normal in the attack to attach a light tank company to the battalion. In the tank company the tank platoon is the smallest division in which it can be broken down for attachment to other units. The light tank company is composed of Renault tanks.

Replying to the question whether the tanks can hold captured terrain, the author states that once the tanks reach their objective they maintain their fire until their fire echelons can come up and then cover their deployment until they are ready to fire, protecting them against counterattacks.

The author in his article has shown that the French battalion possesses greater defensive strength than offensive strength, which in itself is great. The support of the tanks helps in forcibly driving the attack through.

(36) SPARSAMKEIT BEI ZUTEILUNG VON KRAFTFAHRZEUGEN. [Economy in the assignment of motorized vehicles.]

During the last French maneuvers all roads were clogged up with trucks whose fuel supply became a most difficult problem. Not only is it the tendency but also considered a necessity in France to make the sector of the principal effort narrower than the others. Now if troop units are amply supplied with motor transportation it can readily be seen that all serviceable roads would soon be jammed with vehicles.

There is a possibility that in the event of war many trucks will be requisitioned for the service, depending if all demands by troops for them are approved. It is also probable that factories will not be able to meet the needs or demands at that time. Also it is a known fact that trucks are kept in service in civil life longer than are the pleasure cars. In Germany, however, only 30 per cent of the trucks are less than 4 years old, and the possible military value of the other 70 per cent is questionable.

It is the trend to motorize troops by utilizing the supply vehicles. For every vehicle surplus with the troops there is one lacking in the supply service.

The author gives logistic data of the light truck and wagon trains of a division and favors the use of light truck parks for supply of the troops. He shows how speed, mileage, tonnage, etc., are gained by their use over the animal-drawn trains without considering the fatigue to personnel and animals. He covers the question of replacement vehicles coming from the motor repair units.

The author stresses the need for unusual economy in the use of trucks in an army to meet the troop demands. He states that one truck should suffice for a replacement battalion located in the homeland.

(37) ZUR PERSÖNLICHKEIT DES MILITÄRISCHEN FÜHRERS. [Personality requirements of a military leader.] Major Buhle, Retired

A dissertation on the need of personality, character, and other traits required in a leader.

(38) DIE UNTERWERFUNG ABESSINIENS. [The defeat of Abyssinia.] Colonel v.Xylander, Retired

A short article on the new organization of Abyssinia by the Italians, giving the commanders of each province. The author describes the demobilization scheme and method of awarding the Italian and native troops that had participated in the campaign. Two maps accompany the article: one of the new provinces due to the partition and one of the strategic road net of Ethiopia.

(39) NEUE WELTVERKEHRSWEGE. [New routes of world commerce.]

World-wide air commerce is a thing of the future, although rapid strides have been made. We still have rail and steamship service with us.

The author comments on the proposed canal through the Malakka Peninsula at Krah—proposed and sponsored by the Japanese. This would give Japan a short-cut to India and would improve her market facilities and threaten the British stronghold of Singapore. The canal was to be completed by 1940 and 80,000 Siamese coolies under the direction of Japanese engineers were reported at work on the project. Other reports state that Siam has withdrawn her approval. The author feels that England is powerful enough to prevent Japan from completing this enterprise.

The author also comments on the proposed tunnels of France and England across the straits of Gibraltar. France and Spain want to start this year. The tunnel is contemplated to permit a railroad plus a motor road on either side to pass through it. This would enable troops to cross the straits without air or submarine danger. The tunnel would be 20 miles long.

Another tunnel proposed by the British is from Dover to Calais. The author describes its advantages in transporting troops safely to the continent with supplies, etc., and the evacuation of sick and wounded without hazard to England.

The author also mentions the proposed Gaza—Akaba Canal which would connect the Mediterranean Sea and the Red Sea. He calls attention to the strategic importance of these enterprises. Last of all, he comments on the proposed 147 million dollar shipping canal through Florida in the United States which would reduce the route from New York to the Gulf of Mexico by 465 miles.

(40) DAS ÖSTERR.-UNGAR. GENERALSTABSWERK ÜBER DEN WELTKRIEG. [Account of the World War by the Austro-Hungarian general staff.] Colonel v.Keutnersheim, Reserve

By Major E.F. Koenig, Infantry

11 July 1936

(41) AUSBAU DER SCHWEIZER LANDESVERTEIDIGUNG. [Modernization of the Swiss Army.]

The Swiss military budget has risen constantly since 1930, and now amounts to 100 million Swiss francs. In addition to that, special appropriations in 1933 of 80 million francs and in 1934 of 6 million francs, were voted for the purpose of modernizing the army.

The principal changes are the following: Rifle companies will be armed with 12 light machine guns; machine-gun companies will have 16 heavy machine guns; infantry battalions will have 2 cannon and 4 mortars; medium artillery changed from 120-mm. to 105-mm. mortarized guns; range of the light artillery is increased to 12,000 yards; aviation increased from 150 to 250 planes.

This year an additional 235 million francs (approximately \$80,000,000) has been appropriated for military purposes. This money will be expended as follows: (a) Over half will go for antiaircraft defense, both active and passive. (b) Border defense, based on a system of fortifications. (c) Creation of modern mobile units. (d) Modernization of the army.

The details of the reorganization are still to be definitely determined: during the 1936 session of the legislature the policy will be definitely adopted,

during 1937 the preparations will be made, and effective 1 January 1938 the new organization will become effective.

It is anticipated that the following principal changes will be effected: Border protection will be furnished by special brigades composed of personnel living in the sector to be defended, in order to facilitate rapid mobilization. These will contain infantry, infantry cannon companies, motorized heavy machine-gun companies, bicyclists, and special demolition units.

Instead of the five divisional mountain brigades, there will be only three independent brigades of mountain troops. The mobile units will be organized from the existing cavalry organizations. These mobile units will probably consist of horse cavalry, cyclists, and motorized infantry cannon companies, as well as motorized heavy machine-gun units and tanks.

The entire Swiss army will consist of eight divisions (instead of six as at present). The division will have nine infantry battalions (instead of 15 to 18, as now). Its artillery will consist of nine batteries of light artillery and a battalion of 105-mm. howitzers. Two of the eight divisions will be equipped for mountain warfare.

The present mobilization strength of 110 battalions will be slightly reduced due to the increased amount of overhead and special arms. A remarkable fact is that the number of available recruits has not fallen off in proportion to the reduced birth rate. This is explained by the fact that Switzerland has reduced its infant mortality rate and is also due to the better physical condition of its youth.

By the time this new organization becomes effective, 1 January 1938, it is expected that the fortifications will have been completed as well.

(42) VOM LUFTSCHUTZ EINES ARMEEKORPS. [Antiaircraft defense of a corps.] Braun. (See abstract, page 49)

(43) DAS PROBLEM DER GESCHWINDIGKEIT IN DER NEUZEITLICHEN KRIEGFÜHRUNG. [The problem of speed in modern warfare.] Captain v.Oheimb

The author states that "speed," "mobility," and "rate of combat" are different terms and should not be confused. The motor brought strategic mobility and speed to the battlefield, but armies still move at the rate of its slowest element—the foot soldier.

He says that long distance reconnaissance neutralizes the advantage of mobility, and that it will all end in rigidity of formations as during the World War. The tank was successful only as long as it effected surprise. Now the tank can be neutralized as well. The increased effectiveness of modern weapons is merely developing new methods of defense. The defender is driven deeper and deeper into the earth, and thereby becomes more and more immobile. He states that land armies did not bring the decision in the World War.

Any suggestion as to wide envelopments by motorized and mechanized forces through distant portions of the hostile country the author considers as impracticable, because the entire countryside will already be covered with obstacles to prevent just such a thing, even during the period of political tension. He warns that one should not assume that he advocates a neglect of the motorized arms, but that he is merely trying to dampen the fantastic hopes of motor protagonists, so that in war their disappointment will not be too demoralizing.

18 July 1936

(44) WIE WAR DIE ARMEE DER USA. FÜR DEN WELTKRIEG VORBEREITET? [The preparedness of the United States Army for the World War.]

Of interest to American readers as a none too flattering but accurate analysis of the shortcomings of our army at the outbreak of the World War. The author depends primarily upon quotations from General Pershing, Clemenceau, and other allied sources. The principal deficiencies are enumerated as follows:

Training—Shortage of regular army instructors. No higher training for command or staff.

Munitions—No plan for industrial mobilization. No reserve stocks.

Weapons—The war was practically fought with equipment loaned by the Allies (airplanes, artillery, tanks), or modified allied equipment (Enfield rifle).

Transportation—Shortage of trucks (in the land of mass production), narrow guage railway material.

But, he states, that in spite of all these deficiencies, the entry of the United States Army on the Western Front, decided the war in favor of the Allies.

(45) VOM LUFTSCHUTZ EINES ARMEEKORPS. [Antiaircraft defense of a corps.] Braun. (See abstract, page 49)

(46) ZWEI KRIEGSGESCHICHTLICHE LEHREN. [Two lessons to be learned from military history.] Major Deuringer, Retired

I—Encircling Pursuit Must Be Planned for Early.—The action described takes place in the vicinity of Arras early in October during a phase of the "Race to the Sea." The I Bavarian Reserve Corps has been detraind and defeats the French 70th Reserve Division. Pursuit is urged by all commanders, but the troops are exhausted, and the hostile artillery has not been defeated on 5 October. On 8 October the Corps finally risks leaving four battalions to contain the enemy, and envelops his position from the north, but too late. The French reinforcements have come into line. The author believes that had the I Bavarian Reserve Corps determined on such a scheme of maneuver four days sooner, the French flank would have been gained and could have been turned—the object of the "Race to the Sea." He bases this opinion upon the condition of the French forces, as now known from their official history.

II—Units Must Advance if Possible Without Waiting for Neighboring Units.—The situation is continued. It describes the action of the German Sixth Army north of Arras in the capture of the heights of Loretto. The German XIV Corps is echeloned to the right rear, the German 13th Division to the front, reinforced by seven battalions of the I Bavarian Reserve Corps. Opposite are the French 13th Division and the I Cavalry Corps. The commander of the German 13th Division waited for the advance of his neighbor on the right of the 29th Division, in vain. Finally, when he did decide to attack, he was able to capture the Loretto ridge without much opposition. An analysis now shows that had he attacked immediately without waiting for neighboring units to come abreast, the division would have had a smashing success.

(47) HILFSMITTEL DER ARTILLERIEBEOBACHTUNG. [Aids to artillery observation.] Major Köhler, Retired

During the war the problem of maintaining observation lines proved a tremendous task that was not mastered until the end of the war. The entire artillery effect depended upon complete communications.

Today the radio-telephone makes things easier, but not easy enough. The author believes that in the future the photophone (a sort of television apparatus) will automatically replace the human observer. These can be established far in front of our lines, camouflaged, and would work automatically. By sensitizing them to infra-red and ultra-violet rays they would pierce fog and darkness, and would be free from hostile interference.

Dawn and dusk are the best observation periods, for hostile artillery can then be spotted by flash, while it is still light enough to locate them on the landscape.

The autogiro is also valuable in observing fire. Captive balloons are being motorized in France, so that they become independent of their ground crews, and change position at will.

The author does not think much of flash and sound ranging units, for he says that they usually fail during emergencies, and no battery commander will want to see through "strange eyes."

A portable ladder the author considers particularly desirable, and says these can be camouflaged with remarkable ease, by using them in a clump of trees, in back of a farm house, etc. Such a ladder would save all the labor and time necessary for the construction of observation posts in tree-tops, and would be most valuable, if not essential in a war of movement, as the battery commander could then see the effect of his fire with his own eyes.

(48) ZUR FRAGE DER AUSBILDUNG VON RESERVEOFFIZIEREN. [Training reserve officers.] Lieutenant Reitzel, Reserve

In winter training should be theoretical (map problems, map maneuvers, sand table work, etc.); in summer, tactical rides.

Training objective: (a) To be thoroughly up-to-date in the technique of the weapons of his arm; (b) To be terrain conscious; (c) To learn teamwork.

(49) MOTORISIERTER TRUPPEN IM BEWEGUNGSKRIEGE. [Motorized troops in a war of movement.]

(50) INFANTERIETANKS? [Infantry tanks.] Brandt

(51) FEUERKAMPF UND SPATENGEBRAUCH IM ANGRIFF. [Firefight and intrenching during attack.] Lieutenant Brendel

The mission of modern infantry is to advance against the enemy, and not to destroy him by its own fire. He advances under cover of the artillery and the heavy machine gun. The most important training of infantry today is the utilization of the terrain, not in fire technique. Peace-time training should be so that the infantryman will automatically, even in the most difficult terrain, use the terrain and constantly use his intrenching tools to facilitate his advance, until he is ready for the assault. He must learn to do this under the most varied conditions as he will in war, and not on soft, easy ground, that has been dug up before in previous exercises, and then levelled for a new problem. Similarly, after he has gained his objective, his first thought is his defense against the hostile counterattack, and he can only do that effectively if he immediately begins construction of field fortifications.

25 July 1936

(52) DIE RÜCKENDECKUNG DER 8. ARMEE WÄHREND DER SCHLACHT BEI TANNENBERG. WAS KÖNNEN WIR HEUTE NOCH DARAUS LERNEN? [Lessons to be gained by a study of the protection of the rear of the German Eighth Army during the battle of Tannenberg.] Captain Meier-Welcker

Abstract of this article will appear in the next issue of the Quarterly.

(53) GEDANKEN ÜBER DAS ZUSAMMENWIRKEN DER PIONIERE MIT DEN ANDEREN WAFFEN. [Cooperation between the engineers and the infantry.]

(I)

Joint training usually refers to training of infantry with the artillery. This is quite understandable because it is the artillery that enables the infantry to attack, or to defend. Any sort of a training exercise without artillery (at least simulated) is unthinkable nowadays. On the other hand, the engineers are usually neglected in peace-time joint training. This is due in part to the desire to prevent damage to private property, and on military reservations they are not usually needed. Nowadays the engineer has many tasks in all kinds of operations.

The infantry will need the engineers more frequently nowadays than they did in former open warfare campaigns. For that reason alone the infantry should think about the employment of engineers. The fewer the engineers available the more carefully considered must be their utilization. As to cooperation, the teamwork between infantry and artillery points to the proper method of attacking the problem. In the attack the artillery assists in breaking down hostile resistance; in the defense it helps to break down the enemy's attack. The main difference is that the artilleryman operated from the rear over long distances and the engineer has to do his work on the spot. Therein lies the difference in the method of combined training.

The basis of all cooperation is the mutual understanding of each other's capabilities and limitations. Thus the infantryman of today is required to be familiar with artillery technique: range, types of ammunition, method of fire control, etc., so that he will not make inordinate demands upon the artillery. It is also essential that the infantryman know about the capabilities and limitations of the weapons and equipment of the engineers. It is essential that every officer and noncommissioned officer of the infantry be familiar in a general way with engineer technique and tactics. They should all know at least the following:

- (a) The organization of the divisional engineer regiment.
- (b) The equipment of the engineers (main items only).

- (c) Effect of demolitions. (Nothing teaches this as a demonstration with actual explosives. It also teaches the dangers of carelessness in removing road blocks.)
- (d) Amount of demolition equipment carried by the engineers.
- (e) Requirements in time, men, and equipment, for the destruction of bridges. (These are usually underestimated, and results therefore in frequent disappointment.)
- (f) Requirements in time, men, and equipment for construction and removal of road blocks and other obstacles.
- (g) Bridge equipment; its capacity and length.

These requirements should be taught not theoretically, but by means of practical demonstrations. A great deal of this can be witnessed during the training period of the engineers, which should not be done in private, but opened to other troops.

From such demonstrations it will be possible to give the infantry a clear idea of the capabilities and limitations of the engineers. In addition to that, the following should be understood by the infantry:

- (a) Much time is required for the training of engineers and they are difficult to replace. They should be used in combat only under the most exceptional circumstances.
- (b) In view of the few engineers available, the infantry should furnish security for them, and assist them whenever possible.
- (c) The engineer officer should be kept informed of the situations so that he can make suggestions as to the employment of his versatile unit.
- (d) As in general only one company of engineers can support each regiment of infantry, the engineer company commander has a much more extended responsibility than has a battery commander.
- (e) Dividing engineer units reduces their effectiveness as they lack relief parties and lose the advantage of their mechanical equipment.
- (f) Time requirements for engineer work are usually underestimated. It is well to inquire first as to the time that will be necessary to complete a task.
- (g) Obstacles and road blocks vary as to whether they are to be constructed against riflemen, road-bound vehicles, or cross-country vehicles. The type of unit against which the obstacle is to be effective, should be indicated in his orders.
- (h) The amount of available munitions may affect the destroying of a large bridge. In the construction of simple obstacles, the explosives can be "stretched," but quickly made obstacles are expensive in munitions.
- (i) The construction of ordinary obstacles and road blocks, without hidden explosives, can be carried out by the infantry, especially while on outpost or rear guard duty. The removal of these obstacles, however, should be left to the engineers, or to trained infantrymen, in view of the danger of setting off hidden detonations.
- (j) The infantry can suffer losses from its own obstacles, especially from mine fields. Information should therefore be promptly furnished neighboring and supporting units.
- (k) The engineers must be informed if the obstacles they are constructing will have to be quickly removed for our own troops. In that case they will frequently omit the use of mines.

If teamwork and cooperation are assured in this manner, then the complaints of the infantry that they have received inadequate support by the other arms, will gradually disappear. In order to clear up this subject the following commonly-heard complaints against the engineers are enumerated, and a brief explanation added to each:

- (a) "The engineers are not supporting the infantry adequately." This is quite understandable. There are few engineers in the

division, and they must be massed opposite the principal effort. The result is that many infantry units have to do without engineer support.

- (b) "The engineers arrive late." The orders directing them to support the infantry usually reach them quite late, and then they frequently have to cover long distances to reach the unit to which ordered.
- (c) "The engineers are too slow." This complaint arises due to lack of understanding the amount of work involved. The impatient layman usually finds that the preparation and initiation of the task takes longer than he thinks necessary, but he is frequently surprised by the speed with which the work is completed, once under way.
- (d) "The engineers are endangering our own troops." Measures to prevent our own troops from treading upon their own mine fields have been indicated above.
- (e) "The engineers are interfering with our combat, and drawing hostile fire." (Particularly in their activities at prospective bridge sites.) This can be avoided by giving the engineer commander full information of the situation, both enemy and our own.

On the other hand, the engineers make the following complaints:

- (a) "The infantry is late in reporting obstacles." This is due to the fact that the engineers are often hard to find and a long way off. Their own intelligence personnel should tell them of the location of hostile obstacles.
- (b) "The engineers are kept in the dark as to the situation." It is up to the engineer officers to keep in touch with the nearest infantry unit, and to observe the battlefield themselves.
- (c) "The engineers get no help from the infantry." If an engineer officer requires assistance for the carrying forward of equipment and matériel, he is rarely refused this aid when he applies for it in time.
- (d) "The engineers are used for purposes for which they are not intended." If the division engineer makes suitable and timely suggestions as to the employment of his unit, it will probably be committed as he suggests.
- (e) "The infantry is demanding the impossible from the engineers." After both branches have learned each other's capabilities and limitations, this complaint will gradually disappear.

Command Status.—The engineers will be employed either as a unit under their regimental commander, or distributed to cooperate with the infantry. The former condition is exceptional. In the latter case, shall it be subordination or cooperation with the infantry.

Attachment will be preferred by the infantryman because he then feels that he is assured the cooperation of the engineers. The engineer officer will much prefer to be sent in support. These theoretical differences deserve no consideration in actual war. That method that is the most efficient will have to be used, regardless. In cases of advance guard, rear guard, operations on a broad front, etc., the engineers are always attached. Also in difficult terrain, in battle in woods, and when marching in multiple columns; in other words, whenever the regimental commander can no longer supervise the actions of his unit, then they are attached to the infantry they support. In actual combat, where the engineers have to operate under fire, in removing obstacles, it is essential that they be attached and subordinated to the infantry so that there be unity in the conduct of the battlefield.

In operations where contact with the enemy is not probable, such as in road work, in constructing lateral obstacles, etc., the engineers are not attached, but merely supporting the infantry.

Unlike artillery, once assigned a task they can not be readily shifted to other missions. A lateral displacement is usually made impossible by

the enemy. Therefore they should not be committed prematurely, for once attached, they can not be readily recalled. Later in the course of the battle a vital need for them may arise. Engineer reconnaissance and intelligence are an integral and necessary part of engineer operations. Only by prompt reports and by anticipation can the engineers be committed according to sound principles. Engineer officers themselves can do but little reconnoitering. They must depend largely on prompt reports from infantry patrols, and on the early reporting of existing obstacles and mine fields.

(54) ORGANISATION DER FLUGABWEHR UND BEDARF AN FLAK. (ANSICHTEN IN FRANKREICH, RUSZLAND UND SCHWEDEN.) [Organization of antiaircraft defenses. Requirements in antiaircraft artillery. Current opinion in France, Russia, and Sweden.] Colonel Nagel, Retired

France divides its organization to the D.C.A. (défense contre aéronefs); that is, the antiaircraft defense of the land forces, and the D.A.T. (défense aérienne du Territoire), the home defense, which includes the warning services and civilian aids.

The army antiaircraft services are allotted to each field army by general headquarters in accord with the situation. Their control remains centralized at each army headquarters. This includes their antiaircraft artillery, searchlight units, machine-gun defense, and barrier balloons. This army control is considered essential. While the army is in home territory the D.A.T. of that locality passes to the control of each army concerned, but may not be moved by them. The army divides its area into aerial defense sectors. The basic unit of each sector is an antiaircraft artillery gun battalion. The sector commander has responsibility for the antiaircraft defense from the ground. Corps are assigned antiaircraft units only for special missions. Normally they are not attached but in support of the corps. The normal distribution provides for one antiaircraft artillery gun battalion for each corps, which is considered ample for the protection of a corps during the advance and for the protection of defiles and bivouac areas, as well as all other tactical operations. The army, however, may assign an additional antiaircraft artillery unit for the protection of rear establishments.

Russia.—All antiaircraft activities are directly under the military, even the P.W.O. (Protiwa woschduschnaja oboronja), the home defense. They all are organized into eleven corps areas. Each corps has a battalion of antiaircraft artillery assigned. This may be reinforced by army or general headquarters. Coordination of all antiaircraft activities lies with corps headquarters. This includes not only the customary units involved, but also pursuit aviation and antigas measures. Pursuit aviation, however, is attached to the corps but rarely; usually only when the corps is making the decisive attack. In other words, everything pertaining to defense against hostile aircraft is under a single command, with the exception of the interior defensive measures by the combat troop themselves, in which, by the way, the artillery is included.

In the March-April 1935 issue of "Wojna i revoluzia," an article appeared suggesting that control be more flexible and, in addition to the organic corps units, the army and general headquarters have more means at hand. It was suggested that the antiaircraft artillery and the aviation be under a single staff officer at army headquarters, and that, except in case of mobile warfare, antiaircraft operations be more centralized, to provide unified use in any one theater of operations.

Owing to the fact that complete superiority in the air can never be permanently established, and hostile aviation can always affect the operations of ground troops, the antiaircraft defense has become of paramount importance in all military operations of today. The British regulations call for 24 to 36 antiaircraft guns for each 12 miles' front, while the French and the Americans teach the use of approximately two guns per 1000 yard front. The depth of armies has increased greatly in the last few years, and the range of aviation is practically unlimited. Therefore, an army making a thrust on a frontage of 36 to 48 miles would require a tremendous number of antiaircraft guns.

In the above-mentioned Russian article, they estimate the following requirements in antiaircraft means: In the case of an attacking front of 36 to 48 miles, they estimate them for each 1000 yards of front as: 3-4 pursuit planes, 3 antiaircraft guns, 3 searchlights, 20 antiaircraft machine guns.

The "Coast Artillery Journal" estimates the requirements for an army of four corps (12 divisions), as 144 guns, 144 searchlights, 576 antiaircraft machine guns. In addition, 200 antiaircraft machine guns are required for the rear areas. According to this publication, a British army of 12 divisions is equipped with 144 to 288 pursuit ships, 288 antiaircraft guns, 360 antiaircraft machine guns, 577 to 1152 searchlights. In other words, 3.5 antiaircraft guns per 1000 yards of frontage.

An antiaircraft battalion of three batteries is required to protect each (at the most, two) airdromes.

The Russians believe that in the defense of localities the antiaircraft artillery should be able to hit a bomber before he can drop his load. Flying 5000 to 12,000 feet high at 150 miles per hour, each gun would be 1000 yards from the town. If the radius of the town is 3000 yards, the guns 1500 yards from the edge of the town, the antiaircraft guns will occupy a position almost 18 miles long, and will require 6 gun batteries, each 3 miles apart. In the gaps there should be additional security against low-flying aviation. According to Winogradoff, the antiaircraft artillery should be situated beyond the objective in general as follows: antiaircraft guns, 2000 to 3500 yards; antiaircraft heavy guns (presumably calibers larger than 75-mm.) 3000 to 5000 yards. Smaller targets to be defended by guns or machine guns not more than 500 yards away, or even within the target.

Sweden.—Lindblatt, in an article in the "Ny Mil. Tidskrift," May 1935, lays down the principle that the defense should always be sufficiently strong so that the aerial attack will cost the enemy more than it is worth. The less important the objective, the less antiaircraft equipment is required. On the other hand, it is difficult to gauge the importance of smaller targets. If, for example, the destruction of ten small dumps costs two airplanes apiece, the effect on the attacker is the same as if he had lost 20 planes in a raid against a single large depot. The smaller the target the lower the bombers have to fly in order to hit it, and the smaller the caliber of the antiaircraft weapons which can defend it.

An example of area defense is the antiaircraft defense of Paris, as gathered from newspaper accounts of 1932. There were to be two zones. An inner one defended by 12 groups, approximately 6 miles from the city center. Each group to have 3 semi-fixed batteries (of 4 guns each, 75-mm.), 9 searchlights, and 9 sound locators. The outer zone, approximately 9 miles from the city center, was to consist of 14 groups, each of 4 batteries, 12 searchlights, and 12 sound locators. This makes a total of 92 batteries and 266 lights and sound locators. In addition, 5 to 10 fixed batteries in the forts are to be considered. The inner zone groups are to be raised to 4 batteries each, the outer zone groups to 9 batteries, giving a total of 179 batteries. Additional antiaircraft defenses are provided for, which extend all the way to the German border.

4 August 1936

(55) GEDANKEN ZUM X. BAND DES WELTKRIEGSWERKES ÜBER DAS KRIEGSJAHR 1916. DAS FELDHERRNPROBLEM. [Comments on Volume X of the German Official History of the World War (1916). The problem of leadership.] (I) General Wetzell, Retired

Volume X of the German Official History of the World War is just off the press. It concerns itself primarily with the battles around Verdun in 1916, but the two closing chapters touch the question of General von Falkenhayn as commander-in-chief. The reviewer thinks that the choice of a commander-in-chief is of the utmost importance and gravity to a nation. In fact, the fate of a nation rests in his hand. After Moltke's close leadership had led to the First Battle of the Marne, a change was indicated. The political influences surrounding the Kaiser dictated the choice of the then Minister of War, Falkenhayn, who had not as yet been given an opportunity to display his talents. The reviewer thinks this choice unfortunate

for Germany, and suggests that it would have been far wiser to have given command to the Hindenburg-Ludendorff team that had done such great things in the east. Falkenhayn later showed his ability as an army commander in the Rumanian campaign, and with the efficient staff in the eastern theater of war, would probably have proven very capable. Again the reviewer emphasizes the importance of choosing the proper commander-in-chief, whom he feels should be free of politics, but based purely and simply on military efficiency and ability.

(56) KRIEGSEINDRÜCKE VON DER SOMALIFRONT. [Impressions of the campaign in Somaliland.]

This is a review of an article appearing in "Rivista di artiglieria e genio," May 1936, by Major Petroni.

The conclusions are summarized as follows:

(a) Soldiers.—The natives are better than white soldiers, especially in endurance, reconnaissance, use of terrain, and as marksmen. The white soldier was more efficient in actual combat.

(b) Animals.—Few horses, mostly mules and camels were used. The camel proved the most efficient of all. It carried loads of 200 to 350 pounds and was better able to withstand hunger, thirst, and heat. Animals, in spite of motorization, were still necessary. The artillery used camels exclusively. No animal-drawn vehicles were used.

(c) Motor Vehicles.—They overcome all terrain difficulties—brush, gorges, creek beds, and mountains. But they did require unexpectedly large quantities of personnel for maintaining. Greasing had to be given only with the best quality of lubricants and a full allowance every 500 miles. They consumed much water, and the radiators had to be frequently cleaned with chemicals. Air filters had to be constantly cleaned, and the tire pressures frequently checked, due to temperature changes. Loading had to be done carefully, and it was found that overloading forward was particularly disadvantageous.

(d) Tactical.—Observation difficult due to bushes. Nothing to see. Orientation: Compass absolutely essential—without one, messengers were habitually lost. Communications: Bicycles worthless. Runners: native better than white. Best of all, the racing camel. Pigeons useless due to birds of prey. Visual signalling almost impossible due to sun glare. Blinkers useful at night. Telephone required tremendous efforts for installation and maintenance. The wires were destroyed by the camels, the poles eaten by the termites (in 24 hours poles would be devoured). Radio, fine. Double the range as at home, but demanded care in handling, packing, shipping, and trained personnel to operate. Aviation was the best means of communications after the camel and the armored car.

Range estimation—very difficult due to glare. Much trouble with mirage. Shooting—targets difficult to designate; machine-gun fire in small bursts only was used. No indirect fire for machine guns. The artillery acted as accompanying guns with the infantry. No complicated firing schedules were found necessary. Security measures—distances had to be increased. Security was necessary not only to the front, but to flank and rear as well. In combat it was hard to tell friend from foe. Gaps were normal; there was no contact with neighboring units. Zones of advance were useless. Everything was cloaked in uncertainty; no one knew where the enemy was. Armored vehicles usually found gaps in the bush, or made them. The bayonet proved useful. All patrols had to be large, for they used up a large proportion of their force in security and contact missions. Sentries and patrols operated under high tension, for the enemy would sneak up noiselessly on them. In combat the counterattack proved the best means of defense. Mobility of all units from the smallest to the largest was found to be the principal characteristic of this war.

(57) GEDANKEN ÜBER DAS ZUSAMMENWIRKEN DER PIONIERE MIT DEN ANDEREN WAFFEN. [Cooperation between the engineers and the infantry.] (II)

In this second installment the author goes into great detail as to the proper employment of the engineers during various tactical situations. Beginning with the advance, the use on outpost, he continues with their

use during the attack, in the defense, and in river crossings. He discusses the location of the engineer commander and states that the same principles apply as to the artillery, and stresses finally, constant and complete liaison with the infantry and the artillery as essential to an efficient employment of the engineers.

(58) DIE ENTWICKLUNG SINGAPORES ZUM STÜTZPUNKT. [The base at Singapore.]

(59) ÜBER DAS "PLINZNERN" DER ANKAUFSPFERDE. [Difficulties with remounts.] Lieut. General Marx, Retired

This article discusses the change in horsemanship introduced in the German army about 1902 as a result of a court master of the horse, named Plinzner. This consists of a change from the traditional working of the horse from the rear to the additional use of aids forward. It decries the over-emphasis of rein as opposed to seat and leg. It discusses the wooden-mouthed remounts purchased during the war, and especially the "stargazers." These latter were cured by using the hands low, sawing gently at the mouth, and letting them chew the bit. This was strictly against the then current regulations, and the enlisted personnel did not know how to apply the system properly. "Plinznered" horses carried their heads too low and chewed the bit, but they were easier to get away from the troop than the other horses. The author concludes that from a tactical viewpoint the use of reins with low hands is to be preferred to the regulation method of loose rein, high heels, and leg aids alone.

11 August 1936

(60) GEDANKEN ZUM X. BAND DES WELTKRIEGSWERKES ÜBER DAS KRIEGSJAHR 1916. DAS FELDHERRNTUM FALKENHAYNS. [Comments on Volume X of the German Official History of the World War (1916). Falkenhayn's leadership.] (II) General Wetzell, Retired

This article is a continuation of the one published in the preceding number of the "Militär-Wochenblatt" and goes into further detail as to the type of man Falkenhayn was. The article is of particular interest to students of military history, for it expresses the current German viewpoint as opposed to British opinion, which still considers Falkenhayn as one of the most able of the opposing commanders.

General Wetzell states that, as opposed to Moltke, who left too much initiative to his army commanders, Falkenhayn tried to do everything himself. He had unbounded self-confidence, to a degree which made him reject suggestions and advice from his tactical and technical staff, as well as from the commanders in the East. He was deaf to the scheme, which Moltke had already laid the foundation for, and which was urged upon him by von Bulow and the Crown Prince of Bavaria, to convert the stalemate on the Western Front once more into a war of maneuver. He nullified the strategic projects of Hindenburg in the east by refusing adequate support for the offensive against Warsaw, which was to end later in the battle of Lodz. Instead, he preferred the stubborn contest at Ypres.

The only creditable operations conducted during his leadership was the campaign against Gorlice and the campaign in Serbia, both made in cooperation with Austria.

At the beginning of the year 1916, Falkenhayn made his biggest mistake by trying to capture Verdun.

General Wetzell is of the opinion that Falkenhayn should be particularly reproached for lack of an adequate training policy, and the failure of general headquarters to make provisions for joint training of the arms, and to assure itself that all units went into battle adequately prepared from a training point of view.

The three policies which seemed to guide Falkenhayn's operations are summed up as follows: (a) Give up no terrain without battle. (b) Attack the enemy at his strategically strongest point. (c) Achieve the maximum success with the minimum of forces. All three so obviously violate the principles of war; that if these were really Falkenhayn's guiding principles, we can well understand the disgust of current German opinion.

He bled his country white trying to achieve a penetration at Verdun, the strongest point on the entire French front, and piecemealed his forces

in trying to employ as few troops as possible. He underrated the defensive power of the machine gun, and overrated the destructive and offensive capabilities of the heavy artillery. At that time gas was not yet in general use. Verdun was beyond the capacity of the German armies of that day, especially as Falkenhayn was unwilling to commit his strategic reserves, but was holding them for a possible counteroffensive.

To attack the strongest hostile portion of the line was in direct contradiction to any and all previous principles, as well as opposite the practices of the German and Allied leaders during the World War.

(61) "NACHTRUPPEN" BEIM HINHALTENDEN WIDERSTANT. [Covering forces during the withdrawal.] General Reinicke, Retired

The problem of delaying the enemy in successive positions becomes more and more involved, the more one studies it. It is a tactical operation usually conducted by relatively weak forces against the overwhelming strength of the advancing enemy. The danger of a hostile breakthrough and subsequent envelopment must be constantly guarded against and anticipated. The withdrawal to successive positions offers a number of problems. This article will merely touch on the subject of "when," and concentrate on the "how."

It is very easy to say that when the enemy threatens a strong attack, one should organize as for a defense. That calls for an outpost line of resistance, a main line of resistance, observation posts for all weapons, and protection of the observation by the infantry; it calls for organization in depth. In addition to that, each battalion is to cover a front of 1000 to 4000 yards, and to simulate defense in the main line of resistance by committing a number of units to the defensive position. Where are the forces to come from for organization in depth, especially if the enemy is threatening an envelopment; where are the reserves to come from to meet an attack from flank or rear? If you narrow the frontage then you are inviting the enemy to envelop. The only thing to do is to withdraw, preferably at night, to a position far enough in rear to permit a new set-up, which is being coordinated by a senior officer sent ahead by the division commander. The next thing is to organize the initial position so that the enemy can not break through and bring direct pressure to bear on the withdrawing main body and disorganize it. The enemy must be delayed until the mass of the division has gained adequate distance. The division commander will already have had his engineers block all roads along which the enemy could have sent motorized encircling forces, and he will have canalized the advance of the enemy, so that he can be harassed by long-range artillery fire.

The objective of the commander should be:

- (a) To deceive the enemy as to the time of withdrawal. This is easier in fog, at dusk and dawn, and in bad weather, than in clear weather.
- (b) To provide for a defense in depth at those places where a hostile attack would be the most dangerous.
- (c) To provide measures to prevent the enemy from arriving at the same time or even ahead of our troops at the new delaying position, by anticipating any enveloping or encircling movements on his part.

These tasks all fall to the lot of the covering forces. We also assume that the division is supplied with the services of observation aviation, so that it can determine in time the hostile forming up, tank concentrations, and attempts at encirclement.

If any of these activities come to the notice of the division commander too late, he can do little, in view of his overextended position, and the distances that his reserves would have to travel.

If we assume a division to occupy a delaying position 15,000 to 21,000 yards in extent, garrisoned by three infantry regiments, then it means that each regiment has to take over sectors of 5000 to 7000 yards wide. As a result the regiments will have to use all three battalions in line.

The front lines, of course, will have to show gaps, which will be bridged by means of heavy machine gun bands, supported by mortars and artillery. In close terrain small infantry groups with automatic rifles will have to

provide continuity of fire. Only a cleverly planned and carefully executed employment of all available weapons will make this line what its name implies: a main line of resistance.

Owing to the extent of the sectors, the attached artillery will be further suballotted and attached to battalions. In spite of this, provisions will have to be made for the coordinated use of all the artillery fire; for example, in passing to the defensive, or in case of localized counterattacks. The same decentralization with contingent close centralization will apply to the mortars and antitank units. Small combat teams will have to carry on the battle in the usual case.

The necessity of small reserves of the infantry regiments and battalions should consist of motorized infantry with heavy and light machine guns, mortars, and antitank guns.

We can also see that the division commander can not very well determine the strength and composition of the covering forces, for this varies in each sector, and should be left to the judgment of the local commander, in accord with the situation.

It is also readily understood that the covering force can not be a single unit, but must consist of various elements of the command along the entire front line. Depending upon the situation these covering forces will halt and delay the enemy in intermediate positions.

The withdrawal will consist, especially in daylight, of platoons and companies, reinforced with supporting weapons, withdrawing at times cross country, or along designated roads toward specific objectives, such as towns, villages, bridges, artificial or natural defiles, where they may have to face about and offer further resistance, or where they rejoin their main bodies. Only gradually, as the distance from the enemy is increased, will these detachments be able to use the regularly assigned roads, and one of the principal problems of the leaders is to reorganize these mixed small groups into larger organizations which can be used once more, and which are protected by regular rear guards. The commanders of these reorganized units must be provided, and all security measures against mechanized units must remain in force until the last of these covering forces has arrived at the next position.

To summarize: The characteristics of a delay in successive positions are:

(a) Meticulous reconnaissance from the air and on the ground to determine hostile preparations for an attack and penetration, envelopment or attempts at encirclement.

(b) Preparations for the quick assumption of the defensive; small mobile reserves to be kept ready.

(c) Allotment of the artillery to the infantry, but still retain the capability of bringing massed fire to bear.

(d) Establishment of road blocks to prevent a hostile envelopment or encirclement.

(e) The designation of the covering forces can not be made by the division commander; too much depends on the local situation.

(f) It is desirable to be able to reorganize the covering forces, which are withdrawing on a broad front in small combat teams, into tactical organizations, before the advent of darkness.

(g) Clear, but detailed orders to the covering forces are essential; they, as well as the commanders, would be equipped with an adequate supply of runners.

(62) GEDANKEN ÜBER DAS ZUSAMMENWIRKEN DER PIONIERE MIT DEN ANDEREN WAFFEN. [Cooperation between the engineers and the infantry.] (III)

In the concluding instalment, the author discusses the employment of engineers with the cavalry, mechanized forces, chemical troops, and the use of large engineer organizations in the corps and army. The principles enunciated are practically identical with ours, and therefore require no repetition.

(63) DER MILITÄRSTRATEGISCHE VORSTOSZ DER SOWJETUNION ZUM NÖRDLICHEN EISMEER. [The strategic advance of Russia towards the Arctic.]

(64) FLIEGERABWEHR AUS DER KRAFTWAGENMARSHKOLONNE AUF GERADLINIGEN STRASZEN. [Antiaircraft firing from motorized columns on straight roads.]

The author warns of the danger from descending projectiles in the case of machine-gun antiaircraft firing from moving motorized columns. He also considers that troops should avoid these motor roads, as they will suffer casualties incident to air attacks on motor columns. As planes attack a column usually from head or tail, antiaircraft firing is usually along the axis of the road. In the case of long straight roads, the impact of this firing may be on that road, and strike some other unit of the column. The author also fears that in the case of a moving column the gun may slip due to jolts and firing into the preceding or following vehicle, and if not killing the driver, at least puncturing the radiator or splintering the windshield. He suggests the use of a stop which will prevent a low angle of fire, or one exactly in prolongation of the road.

MILITARY ENGINEER

September-October 1936

- (1) THE TOWN OF FORT PECK. Captain Plank
 - (2) THE SPANISH CONQUEST OF GRANADA. Major Knauff
 - (3) TYGART RIVER RESERVOIR DAM. First Lieutenant Potter
 - (4) MEMEL AND ITS PROBLEMS. Major Reynolds, Royal Artillery,
- Retired
- (5) MOTORIZATION AND THE ENGINEERS. Lieut.Colonel Fowler
 - (6) RECENT DEVELOPMENTS IN AERIAL MAPPING. Captain Talley
 - (7) GEOPHYSICAL PROSPECTING FOR PETROLEUM. Rosaire
 - (8) WHAT PRICE NEUTRALITY! Lieut.Colonel Hall
 - (9) STRATEGIC MINERAL SUPPLIES—8. MERCURY. Major Roush
 - (10) MADDEN POWER STATION. McIlhenny
 - (11) DIESEL ENGINES AND THEIR BROAD FIELD OF SERVICE. Hale
 - (12) EVOLUTION OF COMMUNICATION. Rhodes
 - (13) SEEPAGE AND UPLIFT UNDER DAMS. Lieut.Colonel Besson

MILITARY SURGEON

September 1936

- (1) SPECIALISM AND POSTGRADUATE TRAINING IN THE MEDICAL DEPARTMENT OF THE NAVY. Rear Admiral Rossiter
- (2) MARINE HOSPITALS AND BENEFICIARIES OF THE PUBLIC HEALTH SERVICE. Christian
- (3) ADMISSION TO THE MEDICAL DEPARTMENT OF THE ARMY HALF A CENTURY AGO. Major Hume
- (4) A NEW PACK-SADDLE LITTER. Lieut.Colonel Scott
- (5) EXPERIENCES OF AN ARMY MEDICAL OFFICER DURING THE SAN FRANCISCO EARTHQUAKE. Major Kirk

October 1936

- (6) MEDICAL ASPECTS OF FIRST ARMY MANEUVERS AT PINE CAMP, N.Y., AUGUST, 1935. Colonel Grissinger
- (7) THE EXPERIENCES OF A SENIOR MEDICAL OFFICER ON TRANSPORT DURING THE WORLD WAR. Colonel Burrage

NAVAL INSTITUTE PROCEEDINGS

September 1936

- (1) PILOTING AND MANEUVER DIAGRAM. Lieutenant Ballreich
 - (2) BRITISH DESTRUCTION OF ZEPPELINS. Smith
 - (3) VULNERABILITY OF AIRSHIPS TO AIRPLANE ATTACKS. Lieutenant
- Van Swearingen
- (4) HERALDRY AND OUR INTERNATIONAL SIGNAL FLAGS. Lieutenant
- Nyland

- (5) A BREACH OF NEUTRALITY. Lieutenant Olch
- (6) A GREAT WARRIOR'S LAST SACRIFICE. Captain Ellicott
- (7) ON THE DUKE OF WELLINGTON. By "The Shop Philosopher"
- (8) NAVAL TACTICS FOR LAND WARFARE. Major Fisher, U.S. Army
- (9) THE BRITISH NAVY AND THE TOBACCO TRADE OF VIRGINIA AND MARYLAND. Gray
- (10) THE TEXAS NAVY. Rear Admiral Robison

October 1936

- (11) OUR NAVY TODAY. The Honorable Claude A. Swanson, Secretary of the Navy
- (12) THE UNITED STATES NAVY AND ITS FUNCTIONS. The Honorable H.L. Roosevelt, The Assistant Secretary of the Navy
- (13) THE FUTURE OF ARMS LIMITATION. Admiral Standley
- (14) THE AMERICAN MERCHANT MARINE; ITS ROLE IN THE NATIONAL ECONOMY. Walsh
- (15) NAVAL PERSONNEL OF TODAY. Rear Admiral Andrews
- (16) THE FLEET MARINE FORCE. Major General Russell
- (17) THE SHIPS THAT COUNT. Captain Knox
- (18) THE UNITED STATES NAVAL ACADEMY; IT BELONGS TO THE FLEET. Rear Admiral Sellers
- (19) THE UNITED STATES FLEET. Admiral Hepburn
- (20) SALIENT POINTS AND PLAIN FACTS CONCERNING THE AMERICAN MERCHANT MARINE. Lieutenant Commander Haag
- (21) NAVAL AVIATION. Rear Admiral Cook
- (22) SOME SCIENTIFIC ASPECTS OF THE NAVY
- (23) THE NAVAL COMMUNICATION SYSTEM. Rear Admiral Rowcliff

PIONIERE (Germany)

By Major F. During, Infantry

May 1936

- (1) TRUPPENFÜHRER UND PIONIERE. [Command and engineers.] Major v.Ahlfen

The author points out in this article that engineers are necessary at river crossings, in the defense, in delaying actions, and in pursuit, but usually they are used too late and sometimes not at all. Major v.Ahlfen gives four examples for the use of engineers when part of a reinforced brigade. Orders for the engineers should be given them in sufficient time to allow for necessary preparations.

- (2) PIONIERAUSBILDUNG BEI DUNKELHEIT. [Training engineers to work at night.]

The unknown author stresses the necessity for training engineers to work at night. Troops that have been trained to use their ears as well as their eyes at night, and to work noiselessly, will be of great value in war.

- (3) DER STAU ALS WIRKSAMES HINDERNIS. [Inundation as an effective obstacle.] Dr. Kraus

The object of the article is to show that engineers, by appropriate measures, can utilize the different natural conditions for the creation of artificial inundations.

- (4) ERFAHRUNGEN AUS DEM GEBIRGSKRIEG. [Experiences in mountain warfare.] Lieut.Colonel Winkelmann

The author states that the tactical principle for mountain warfare is that all ranks must be filled with the idea that for the attacker there is no insuperable obstacle. He states that the word "impassable" should be used with great care, since the degree of passability changes with every change of weather. It is only occasionally true that any mountain hazard is impassable. Every height can be taken, every gun can be gotten into position, provided the will to do so is present and the time will permit. In mountain warfare the independence and the personal influence of the subordinate leader are the key to successful operations.

- (5) BESEITIGEN VOM BAUMSPERREN. [Removal of tree obstacles.] Captain Schaette

- (6) DIE DEUTSCHEN KÜSTEN- UND INSELBEFESTIGUNGEN BEI AUSBRUCH DES WELTKRIEGES. [The German coastal and island fortifications at the beginning of the war.] Major Dinter

QUARTERMASTER REVIEW

September-October 1936

- (1) THE SCHEME OF SUPPLY. THE AUTOMATIC RATION AND PREPARED MENU, 2ND ARMY MANEUVERS. Major McReynolds
(2) THE CONSTRUCTION SERVICE OF THE VETERANS ADMINISTRATION. Major Lewis
(3) HISTORY OF THE HAWAII NATIONAL GUARD. Lieutenant Warfield
(4) THE PHILADELPHIA QUARTERMASTER DEPOT. Colonel McCain
(5) GUIDE FOR SALES OFFICERS, U.S. ARMY. Major Porter, and J.O. Wilson
(6) THE QUARTERMASTER STOREHOUSE OF KNOWLEDGE. PROBLEM No. V

RESERVE OFFICER

July 1936

- (1) GENERAL CRAIG OUTLINES PROGRAM
(2) PROGRESS IN GUNFIRE

August 1936

- (3) THE PRICE OF PEACE. Haseltine
(4) AFTER VERSAILLES AND ROME. Major General "A"

September 1936

- (5) ON CAMOUFLAGE TRAINING. Captain Rodyenko
(6) THE SPANISH REVOLT. Major General "A"
(7) "THE C.C.C." IN GERMANY. Captain Ringland
(8) MANEUVERS OF THE SECOND ARMY

REVUE DE L'ARMÉE DE L'AIR (France)

By Lieutenant Colonel L.H. Brereton, Air Corps

March 1936

- (1) ESQUISSE D'UNE DOCTRINE DE L' "AVION-PROJECTILE." [Outline of air doctrine as affected by the development of a "projectile-airplane."] Captain Etienne

The author suggests the use of small high speed aircraft having no military load other than the pilot, the necessary fuel, navigating instruments, and bombs; the ceiling to be only that necessary to develop maximum power for best speed. Reliance is placed on speed for surprise both against aircraft and antiaircraft artillery. The principle of the objective, mass production and reduced cost, are advanced as advantages over the super-bomber. Speed becomes the sole defense. The necessary adaptation of research facilities, engineering, training, manufacture, and installations are touched on.

- (2) L'AVIATION NAVAL FRANÇAISE.—SON ORGANISATION EN MÉDITERRANÉE. [French naval aviation and air units in the Mediterranean.] Commander Delahaye

A survey of the air organization in the Mediterranean Sea area. The author discusses the employment of land and carrier based aircraft and surveys the organization of the fleet air forces, and its missions.

- (3) SOUVENIRS D'UN PILOTE ALLEMAND SUR LA GUERRE AÉRIENNE EN PALESTINE. [Memories of a German pilot in Palestine.] (I) Lieutenant Haefner

Notes on German air and ground operations in Palestine from November 1914 to December 1917, from personal experiences of the author. Some interesting side-lights on both German and British operations when compared with Jones' "The War in the Air," Volume V.

April 1936

(4) VALEUR DU CAMOUFLAGE CONTRE L'OBSERVATION AÉRIENNE. [Efficacy of camouflage against air observation.] Bouché

Notes on various examples of camouflage as attempted in the World War. Defects and suggestions for improving camouflage.

(5) RÉFLEXIONS SUR L'ÉVOLUTION TECHNIQUE DES AVIONS. [Notes on the technical evolution of airplanes.] Breguet

The author discusses the future probabilities of aeronautical engineering and its influence on military airplanes. Potential value of the autogyro and its development into the "gyroplane."

(6) SOUVENIRS D'UN PILOTE ALLEMAND SUR LA GUERRE AÉRIENNE EN PALESTINE. [Memories of a German pilot in Palestine.] (II) Lieutenant Haefner

Covers some incidents of German and British air operations from January to September 1918.

(7) DE QUELLES ASSURANCES PEUT BÉNÉFICIER LE PERSONNEL NAVIGANT DANS L'ARMÉE DE L'AIR? [Protection of flying personnel of the Air Army as provided by law and life insurance.] Lieutenant Feintrenie

An informative article on the laws covering indemnity to military flyers, with references to civilian insurance.

(8) BOMBARDIERS CONTRE CHASSEURS. [Bombardment versus pursuit.]

Notes on comparative performance of bombardment and pursuit. Interception and tactics. This subject is thoroughly covered in text and references from American sources.

May 1936

(9) LE BOMBARDEMENT AÉRIEN DANS LA GUERRE SUR MER. [Air bombardment in sea warfare.] Captain Rougeron

The author discusses the extreme vulnerability of warships and naval bases to air attack by bombardment. The danger of attack on fleet concentrations and bases prior to a declaration of war is stressed with particular reference to the vulnerability of existing bases in the continental countries of Europe. Possible modifications in fleet tactics to reduce danger from air bombardment are mentioned. The possible role of air force as a commerce destroyer is mentioned, and the present restrictions in this employment imposed by international comity.

(10) TIR AÉRIEN ET MÉTHODE DE TIR. [Air gunnery and methods of fire.] Captain Matignon

A discussion touching on theoretical and practical methods of aimed aerial fire.

(11) HISTOIRE DE LA GUERRE AÉRO-MARITIME DANS LES FLANDRES EN 1918. [History of naval air operations in Flanders, 1918.] (I) Lieutenant Barjot

Notes on air operations against the submarine menace, including the German shore bases in Belgium.

June 1936

(12) LES MÉTHODES MODERNES DE PRÉVISION MÉTÉOROLOGIQUE POUR L'AVIATION. [Modern methods of forecasting weather for aviation.] Lieut. Colonel Verdurand

(13) LE BOMBARDEMENT DES IMMEUBLES D'HABITATION. [The bombing of centers of population.] Captain Rougeron

A discussion of the vulnerability of cities and congested areas to air bombardment, with particular reference to large European cities. The author suggests as an ultimate solution that, just as the ancients were forced into walled cities and strongholds for protection against their enemies, the future may see centers of population dispersed into small communities covering large suburban areas for the same reason.

(14) L'ENREGISTREUR "MORANE-SAULNIER" D'EFFORTS SUR LES COMMANDES. [Morane Saulnier indicator to determine forces exerted by pilots in maneuvering airplanes.] By the Research Section Morane Saulnier Company

(15) NOTES ET SOUVENIRS SUR LA CRÉATION DE L'AVIATION MILITAIRE FRANÇAISE. [Notes and personal recollections of the development of military aviation in France.] (I) Lieut.Colonel Bellenger

REVUE D'ARTILLERIE (France)

By Major R.G. Tindall, Infantry

April 1936

(1) L'ARTILLERIE D'INFANTERIE ET DE COMMANDEMENT—LIAISONS. [Infantry artillery and the commander's artillery—liaison.] General Chaleat

The author, one of the leading French artillery authorities, discusses the subject of infantry-artillery liaison, and of accompanying artillery and offers the solution of a battalion of three batteries of 75-mm.-47-mm., each battery consisting of six pieces, to be designated as infantry or accompanying artillery. This would leave the remaining artillery freer to carry out missions assigned by the division commander. The 75-mm.-47-mm. matériel, a few pieces of which are in existence, weighs about 1000 pounds in battery, has wheels of some 2 feet in diameter, can fire twenty 75-mm. shells a minute, has a range of 7500 yards, and is specially adapted for reduced charges and comparatively high angle fire. The 75-mm. tube can be changed for a 47-mm. tube firing the smaller shell at high velocity.

(2) TIR CENTRALISÉ DE GROUPE—BATTERIE LARGEMENT ÉTALÉE. [Centralized battalion fire—battery widely spread out.] Major Le Floch

(3) PRÉPARATION DES TIRS DANS LA BATTERIE ET LE GROUPE. [Fire preparation in the battery and battalion.] Captain Bacquier

(4) CARNET DE ROUTE D'UN ARTILLEUR DE MONTAGNE AU MAROC (1932-34). [Diary of a mountain artilleryman in Morocco, 1932-34.] Lieutenant Herrgott

May 1936

(5) PROCÉDÉ DE RÉGLAGE PAR COUPS FUSANTS HAUTS (MÉTHODE DU RÉTICULE TANGENT). [Method of registering by high bursts.] Captain Béliard

(6) L'ARTILLERIE DE BATAILLE AVANT GRIBEAUVAL. [Field artillery at Gribauval.] Major Lefèvre

Historical treatise on development of field artillery and its use on the battlefield from 1346 to the period of Gribauval, following the Seven Years' War.

(7) FORMULES DE SÉCURITÉ DANS LES STOCKAGES DE MUNITIONS. [Safety rules for storing munitions.] Major Bédet

June 1936

(8) L'ARTILLERIE D'APPUI DIRECT. [Direct support artillery.] Major Maire

A continuation of the discussion current among French artillerymen of the relations between an infantry colonel, the commander of his supporting artillery, and the division artillery commander. The author points to the recent reinforcement of infantry accompanying weapons (mortars) and concludes that the infantry in the future will handle some situations which it formerly called upon the artillery to deal with. The groupment of artillery in direct support of an infantry regiment may therefore have more leeway than previously and will receive fewer requests from the infantry. It therefore may execute more fire missions on its own initiative, always notifying the infantry of the nature of such fires. Requests for definite fire missions by the infantry commander supported continue to have priority over other fires unless the division commander, acting through his artillery commander, decides to withdraw temporarily the artillery groupment from its mission of direct support of that particular infantry regiment.

(9) POSTES CENTRAUX DE TIR DE BATTERIE ET DE GROUPE. [Centralized fire calculation stations for battery and battalion.] Captain Martinenq and Lieutenant Querillac

(10) LA SÉLECTION DES GUETTEURS DE D.C.A. [Selection of anti-aircraft service sentinels.] Captain Donat

A discussion of methods by which suitable personnel may be selected for this rather delicate and important duty.

(11) 1914. BAPTÊME DU FEU DU 61^E RÉGIMENT D'ARTILLERIE. [1914. Baptism of fire of the 61st Artillery.] General Boichut

A detailed account of the experiences of the light artillery regiment of the famous 42d Division on 21 and 22 August 1914 in the Battle of the Frontiers.

REVUE DE CAVALERIE (France)

By Major L.K. Truscott, Jr., Cavalry

March-April 1936

(1) LA CAVALERIE DANS LA GUERRE ACTUELLE. [Cavalry in the present war.] General Audibert

This article is a remarkable study of the exploitation of success, and the employment of cavalry therein. Written in 1915, but not published at that time, the editors state that it is published now because "by its critical character, it will raise profitable reflections in informed minds."

The author states that his purpose is to sketch the role of cavalry by openly declaring what it has not done, and by trying to show what it can do, what it should be prepared to accomplish. The study is in four parts.

Lost Opportunities.—The author touches upon the failure to gain full information of the German maneuver by the north; to delay its advance; the failure to cover the retreat to the Marne; and the failure to exploit the success after the Marne, which he terms "the finest strategical opportunity that cavalry ever had."

He attributes the failures: first, to the superior preparation of the Germans, which gave them not only a numerical superiority, but a more efficient national concentration of the material intellectual and moral strength; second, to a recent tactical school which had substituted the headlong attack for old ideas of security (Napoleonic doctrine); third, to the failure of the French cavalry to know anything about dismounted combat, for which the cavalry is severely criticized. The importance of dismounted combat is emphasized throughout.

The Services Rendered.—As services rendered, the author touches briefly upon: preventing the Germans from outflanking the allied line on the north, turning Arras, and reaching the sea; delaying the Germans from Roulers to Ypres until the arrival of the Eighth Army; holding the battle front for 20 days permitting the arrival of the Yser of 250,000 men who neutralized 500,000 Germans; the morale superiority of French cavalry over the Germans, which prevented the Germans from accomplishing much that might otherwise have been accomplished.

Is the Role of Cavalry Ended?—The author strikes a "balance sheet of the past," listing what the cavalry should have done against the services actually rendered. His conclusion, and the underlying thought of the article, is that all war is solved by battles, and that all battles will be won by employing the three arms: artillery—utilization of ruse; infantry—utilization of strength; and the arm of speed which adds the finishing touch by dispersing and pursuing—utilization of demoralization. As expressed in an epilogue: "Without the thorough exploitation of the victory by a mobile arm, we can win battles, we can not end wars."

What Remains To Be Done.—The author analyzes conditions on the Western Front (in 1915), and points out that the front had been pierced several times, and that the lack of a mobile force to exploit the successes permitted closing the gaps. He follows with a study of the operation necessary, a discussion of the tactical employment of the cavalry in the exploitation in great detail, and presents as a basis for study and work a resumé of the "Instructions of the Commander-in-Chief," dated 18 June 1915, on the subject.

The article is an excellent study of the exploitation of success, and well worth considering with some thought of the increased means afforded by modern mechanized and motorized forces.

(2) LE 4th REGIMENT DE CUIRASSIERS À PIED AUX ATTAQUES DE LAFFAUX (5 MAI 1917). [The 4th Cuirassiers (Dismounted) in the attacks of Laffaux, 5 May 1917.] Lieutenant de Préval

The 4th Cuirassiers, one of the oldest of French cavalry regiments, was formed in 1643 for the Queen, Anne of Austria, who was its first colonel. The regiment was unchanged other than in personnel, until 1791, retaining during this time the name "Queens Cavalry." In the reorganization of 1791, it became the 4th Regiment of Cavalry, and continued to the present day without break, changing in name with the periods, but always retaining the numeral "4," being denominated 4th Cavalry, 4th Cuirassiers, 4th Regiment of Angloueme-Cuirassiers No. 4, 4th Regiment of Cuirassiers, and participating in all the wars of the periods. In the World War, it took part in Sordet's operations in Belgium, in the Battle of the Marne, and in the Race to the Sea, after which it sustained its first transformation, becoming the 4th Regiment of Dismounted Cuirassiers. Reconstituted as a horse regiment after the war, it was broken up in 1927, and has just been reconstituted, its name and standard being given to the 4th Group of Auto-Machine Guns.

The article is a chronological account of the operations of one of the front-line companies during the attack, written by the officer who commanded the company. The account is brief, concise, but complete in detail, and pictures the events between 29 April and 6 May 1917, from the point of view of the company echelon.

(3) UNE OPINION ROUMAINE SUR L'ÉVOLUTION DE LA CAVALERIE. [A Rumanian opinion of the evolution of cavalry.] Lieut.Colonel Cantuniar

An interesting discussion of the evolution of cavalry and employment in modern war from a Rumanian point of view.

(4) LE RAVITAILLEMENT EN ESSENCE ET LES CARBURANTS DE REMPLACEMENT. [Supply of gasoline and gasoline substitutes.]

A discussion of the various substitutes on which France can depend in the event foreign supply of gasoline should be impossible.

REVUE D'INFANTERIE (France)

Major R.G. Tindall, Infantry

April 1936

(1) CHRONIQUE DES RÉGIMENTS: LA RÉSURRECTION DU 37^e D'INFANTERIE OU: RÉGIMENT "MARÉCHAL DE TURENNE." [Regimental history: The resurrection of the 37th Infantry, Marshal Turenne's regiment.] Lieutenant Leclerc

This article describes the ceremonies marking the restoration to the active list of a famous regiment of the 11th (Iron) Division which was made inactive at the end of the World War.

(2) LE PREMIER ENGAGEMENT DES CHARS FRANCAIS (16 AVRIL 1917). [The first engagement of French tanks, 16 April 1917.] Lieut.Colonel Perré

The first engagement of French tanks on 16 April 1917, which resulted in a complete check, left an indelible impression on French tactical doctrine. The French views on the employment of fast tanks are in sharp contrast to those held in certain other leading armies. The French view is that the tanks must fight in liaison with other arms, and they reject British conceptions of comparatively independent tank action far from other weapons.

The author insists that there are errors so seductive and tenacious that they are revived again and again despite their failure in the test of war. With the development of the fast tanks, he says old heresies are being revived. Consequently, a study of the first engagement of French tanks, which was rich in tactical lessons, was undertaken. The French engaged 121 tanks in the Nivelle offensive north of the Aisne in the general vicinity of Berry-au-Bac. The tanks were to be used, not in the initial assault, but for the attack of the third and fourth German positions. This was to start at H+4 hours. The tanks were to be used in two parallel strips of terrain some 2½ and 1¼ miles wide, respectively, and separated by a small stream and some villages. The tanks were not attached to specific infantry units and liaison with large units was not well provided for.

The tanks moved forward from their assembly positions soon after H hour in two long columns. Considerable difficulty was experienced in crossing the German front trenches which were 3 to 4 yards wide. Furthermore, the French had neglected to insure vigorous counterbattery during this period, and German batteries with splendid observation took the tanks under fire. Moreover, since French control of the air had not been assured, German planes spotted the tank advance and dropped red flares indicating their position. The tanks suffered heavy losses during their approach march and were somewhat delayed. The French infantry conquered the first two German positions in the zone in which the tanks were to operate, but with the exception of a few units, was so shattered that no further advance was possible. The tanks then attempted to progress alone and advanced two miles into the German lines. Most of them were destroyed.

The article traces the action of each tank in detail and includes extracts of the report of a German artillery commander whose regiment destroyed many tanks. Of the 121 tanks engaged, 81 were immobilized and left on the battlefield, 35 being set on fire.

A peculiar factor in the failure of the French tanks was the efficacy of indirect fire by German artillery on the tanks. It seems that because of faulty construction, many French tanks were set on fire by shells which did not make direct hits but merely burst close to a tank.

After noting that excellent German observation was not smoked and that the French guns which had originally been on counterbattery missions had been shifted to support missions with the result that there was no effective counterbattery, and that the tanks made their approach march in a vulnerable and conspicuous formation, the author analyzes the action of the tanks. Even when acting alone the tanks in this action stopped German counterattacks with extreme ease, indicating that tanks by themselves are extremely effective against infantry in movement. On the contrary, when confronting infantry settled in a position, the tanks obtained tangible and lasting results only when their action was immediately exploited by infantry. Elsewhere the charges of the tanks far ahead of the infantry and without support of other arms, merely resulted in useless losses. The conclusion of the author is as follows:

"May the French tanks keep this guiding conception of their employment in liaison with other arms, infantry in particular; may they adapt it to progress made in technique, rather than reject it as obsolete; that before becoming seduced by hopes of wild mechanical charges, they think of the splendid, but vain and bloody charge of the 5th and 9th Tank Battalions toward the railroad, $1\frac{1}{4}$ miles ahead of the leading infantry. Thus the dead of 16 April will continue to serve beyond the grave."

(3) ETUDES ET NOTES SUR NOTRE RÉGLEMENT. [Studies and notes on our regulations.] Major Armengaud, Captain Renou, Lieut. Colonel Cazeilles, Major LaPorte, General Barrard, and certain anonymous writers.

The authors present varying views on the organization and training of the rifle platoon and either uphold or condemn certain portions of the French regulations. The concept of infantry attack which has been held in the French army since the War, appears to be coming under fire. Likewise a change in the organization of the infantry battalion appears probable, since certain new weapons, the Chenillette, the 25-mm. antitank gun and the 60-mm. mortar, are being put into service. The latter is a rifle company weapon.

May 1936

(4) LA LÉGION ÉTRANGÈRE. [The Foreign Legion.] General Prételat

(5) LA LÉGION ÉTRANGÈRE EN ALGÉRIE (1831-1885). LE COMBAT D'ICHERIDEN (24 JUIN 1857). [The Foreign Legion in Algeria, 1831-1885.] Colonel Tournyol du Clos

(6) LA LÉGION ÉTRANGÈRE EN ESPAGNE (1834-1838). [The Foreign Legion in Spain, 1834-38.] Major Denolle

(7) LA LÉGION ÉTRANGÈRE EN CRIMÉE (1854-1856). [The Foreign Legion in Crimea, 1854-56.] Captain Chalmel

(8) LA LÉGION ÉTRANGÈRE EN ITALIE (1859). MAGENTA ET SOLFÉRINO. [The Foreign Legion in Italy, 1859. Magenta and Solferino.] Captain Joubert

(9) LA LÉGION ÉTRANGÈRE AU MEXIQUE (1863-1866). [The Foreign Legion in Mexico, 1863-66.] Colonel Blin

(10) LA LÉGION ÉTRANGÈRE PENDANT LA CAMPAGNE DE 1870-1871. (Orleans). [The Foreign Legion during the campaign of 1870-71. Orleans.] Captain Host

(11) LA LÉGION ÉTRANGÈRE AU TONKIN (1883-1932). [The Foreign Legion in Tonkin, 1883-1932.] Colonel Tourmyol du Clos

(12) LA LÉGION ÉTRANGÈRE AU DAHOMEY (1892). [The Foreign Legion in Dahomey, 1892.] Major Denolle

(13) LA LÉGION ÉTRANGÈRE À MADAGASCAR (1895-1904). [The Foreign Legion in Madagascar, 1895-1904.] Captain Chalmel

(14) LA LÉGION ÉTRANGÈRE AU COURS DE LA GUERRE 1914-1918. [The Foreign Legion in the War, 1914-18.] Lieut.Colonel Gallini

(15) LA LÉGION ÉTRANGÈRE AU MAROC: QUELQUES FAITS D'ARMES. [The Foreign Legion in Morocco; some deeds of arms.] Major Laxague

(16) LA LÉGION ÉTRANGÈRE EN SYRIE. [The Foreign Legion in Syria.] Captain de Feriet

June 1936

(17) CHRONIQUE DES RÉGIMENTS: LES JOURNÉES DU 15-2 EN ALSACE. [Regimental history: The celebrations of the 152d Infantry in Alsace.] Captain Lettellier

An account of a ceremony of "Fifteen-two," or the 152d French Infantry, in which the regiment welcomed back a large number of war veterans. The "Fifteen-two" is considered the first regiment of France and has a remarkable morale and esprit de corps.

(18) ARTILLERIE D'INFANTERIE ET ARTILLERIE DE COMMANDEMENT. [Infantry artillery and the commander's artillery.] General Challéat

See page for digest of this article, contained in the April 1936 issue of "Revue d'Artillerie."

(19) LA DIVISION DU MAROC LE 28 AOUT 1914. [The Moroccan Division on 28 August 1914.] General Douce

An account of the first important fight of the famous Moroccan Division in which, although committing numerous tactical blunders, it held up the enveloping maneuver of portions of the German Third Army directed against the left flank of the French Fourth Army. The author goes into considerable detail and shows not only the difficulty of execution of orders in war but also the difficulty of establishing what actually did happen.

(20) UN MODE D'ÉVACUATION À L'EXTREME-AVANT: DE L'UTILISATION SANITAIRE DES CHENILLETES DE RAVITAILLEMENT. [A method of evacuation at the extreme front; medical utilization of small supply tanks.] Lieutenant Lemaire

A suggested means of adapting the French small supply tanks, or chenillettes, so that on return trips from carrying munitions forward, they can evacuate wounded from the firing line.

(21) LES ORDRES D'OPÉRATIONS. [Operation orders.] Lieut.Colonel Hurst

A discussion of operation orders in which the author strongly favors brevity and clarity, which he would achieve by eliminating useless phrases and by increased use of operation maps.

(22) PREMIÈRE APPARITION DES CHARS SUR LES HAUTEURS DU CHEMIN DES DAMES: LES COMBATS DU MOULIN DE LAFFAUX (5 ET 6 MAI 1917). [First appearance of tanks on the heights of the Chemin des Dames; the combats of Laffaux Mill, 5 and 6 May 1917.] Lieut.Colonel Perré

A detailed description of the operation of French tanks immediately following the disaster of 16 April. These operations saved the life of the French tank. The improvement noted in results was due to the following: Abandonment of the use of long columns in the approach march during the battle itself, echelonment in depth of tank units, increased attention to liaison of other arms with tanks, such as assigning definite tank units to support definite infantry units, provision for counterbattery to protect the tanks at critical periods, surveillance of operations by airplanes.

Two striking resemblances to operations of 16 April were noted: tanks acting alone proved themselves again capable of rapidly smashing enemy

counterattacks, enemy in movement, but the action of tanks against defenders in position was never really effective except when it could be exploited immediately by infantry.

REVUE DU GENIE MILITAIRE (France)

By Lieutenant Colonel P.C. Bullard, Corps of Engineers

January-February 1936

- (1) LES MATÉRIELS DE PONTS ANGLAIS. [English bridge equipment.] Captain Beauvais

Description of English bridge equipment, based on a conference reported in the "Royal Engineers Journal," September 1934. Since the end of the World War the British have completely renewed their bridge equipment; not a single World War type remains as standard. The new equipment includes foot-bridge, folding-boat bridge, ponton bridge, and light and heavy metal bridges.

- (2) ETUDE SUR LES TÉLÉFÉRIQUES. [The design of overhead cableways for the supply of troops in mountains.] (III) Captain Leygue

- (3) LE TRAIN DE BETONNAGE DE LA "SOCIÉTÉ PARISIENNE." [The concrete work-train of the Parisian Company.] Lieut.Colonel Metz

Description of one of two work-trains for mixing and placing concrete along railroad lines. Consists essentially of water-tank car, dynamo car, sand and gravel cars, and mixer car.

March-April 1936

- (4) LES TRAVAUX DE PISTE À LA CLUSE DE TASSENT. [Trail-building at the Tassent Canyon.] Captain Tajan

Captain Tajan describes the construction of a trail or narrow road along the side-wall of a canyon in the Grand Atlas Mountains of Morocco, for the purpose of supplying and maintaining the French troops in their operations of putting down rebellion in the country. The trail had to be cut into the rock of the canyon side. Protection was required against the insurgents. Interesting photographs indicate the difficulty of the work.

- (5) QUELQUES INGÉNIEURS MILITAIRES AU XVII^E SIÈCLE. [Some military engineers of the seventeenth century.] (I) Colonel Lazard

Personalities and work of the assistants of Vauban.

- (6) MÉTHODE PRATIQUE POUR LE CALCUL DES CHUTES DE TENSION ET DES SECTIONS DES CONDUCTEURS DANS UN RÉSEAU D'ÉCLAIRAGE TRIPHASÉ À BASSE TENSION. [Practical method of calculating voltage drops and cross-sections of conductors in unbalanced main lines of a low-tension tri-phase lighting system.] Major Allard

May-June 1936

- (7) LE PIGEON VOYAGEUR ET LE MONUMENT DE LILLE. [The carrier pigeon and the monument of Lille.] General Gamelin

- (8) L'ÉCOLE DE TRANSMISSIONS ALLEMANDE. [The German signal school.]

Very brief outline of some of the steps in the development of the German signal corps and signal school.

- (9) RECHERCHE ET CAPTAGE DES EAUX SOUTERRAINES. [Finding and making available supplies of underground water.] Joffet, Chief Engineer of the City of Paris

This article treats of water supply in general, with a few brief remarks on the application of such work to the duties of military engineers.

- (10) QUELQUES INGÉNIEURS MILITAIRES AU XVII^E SIÈCLE. [Some military engineers of the seventeenth century.] (II) Colonel Lazard

REVUE MILITAIRE FRANCAISE (France)

By Major C.R. Moore, Corps of Engineers

April 1936

(1) **GUERRE D'HIER ET DE DEMAIN. ORGANISATION GÉNÉRALE DE LA MANOEUVRE MOTORISÉE.** [Warfare of the past and future. General organization of motorized maneuver.] General Pichon

The author holds that an essential element for the successful maneuver of motorized forces is an adequate territorial organization—this organization to become effective the first day of hostilities by mobilization and by militarization of civil organizations. This territorial force will cover a depth of at least 68 miles and will be responsible for supplying information, for protecting vital points in the road net, and for the control of traffic. The maneuver of motorized forces must be conducted in great depth, and hence must be organized in advance. There must be no guess work as to what is ahead. Agencies for distant reconnaissance are available and these must be required to secure the essential information. Operations in enemy territory are entirely different from those in friendly territory and all peacetime maneuvers should take this difference of conditions into account.

(2) **MOTORISATION ET MANOEUVRE.** [Motorization and maneuver.] Lieut.Colonel Lancon

Colonel Lancon is a lucid writer and a keen analyst of tactical and strategical evolution. His thesis in this article is that the development of mechanized forces appears definitely to have counter-balanced the defensive strength of automatic weapons. Hence we can once more look forward to quick and decisive victories based upon the doctrine of annihilation. The way is open if the units of the type necessary are created, and a system of tactics and strategy is adopted which conforms to the possibilities of motorization.

(3) **LES GRANDES VOIES COMMERCIALES DU PROCHE ORIENT.** [The great commercial routes of the Near East.] Captain Tézé

May 1936

(4) **LA BATAILLE DES FRONTIÈRES (22 AOUT 1914) À LA 42^E DIVISION.** [The 42d Division in the Battle of the Frontiers, 22 August 1914.] General Boichut

(5) **LA DÉFENSE DES COUPURES.** [The defense of obstacles.] Lieut. Colonel Mainié

The defense of obstacles assumes a greater importance than ever before on account of their value in limiting the maneuver of mechanized forces. The essential minimum is to cover the obstacle with a curtain of fire, and to cover any possible crossing points with antitank weapons. Artillery must have observation and positions which will enable it to bombard any bridges or ferries constructed by the enemy.

(6) **LE COMTE SCHLIEFFEN, ORGANISATEUR ET STRATÈGE.** [Count Schlieffen, organizer and strategist.] (I) Major Courbis

This issue contains the first chapter of a study which is to be continued in later issues, according to the following outline:

Chapter I.—The Change from the Plan of Moltke: Schlieffen, Chief of Section and Quartermaster General (1884-1891); The Offensive on the Russian Front (1891-1894); Frontal Attack on the French Front and the Abandonment of the Concentration in Silesia (1894-1896).

Chapter II.—The Violation of Belgian Luxembourg: The Plan of 1898-1899; The Plan of 1899-1900; Discussion on the Organization of the Army; The Maneuver of Double Envelopment (1902-1904).

Chapter III.—The Maneuver Toward Central Belgium: The Plan of 1905-1906; The Plan of 1906-1907; The Memoir of December 1905; The Activity of Schlieffen After His Retirement.

June 1936

(7) **PROTECTION CONTRE LES ENGINS BLINDÉS AU COURS DE LA MARCHÉ D'APPROCHE.** [Protection against armored vehicles during the approach march.] Colonel Ricard

This article is an attempt to clear up the use of terms in the French regulations. The problem of a detached division is eliminated from his discussion, because he believes it will lead to false conclusions if applied to the movement of an army. The advance guard, advancing by bounds, is to be supported by the division light artillery, and hence cannot precede the division by more than about 3 miles unless the artillery is pushed ahead of the division. This distance is not sufficient for anti-mechanized defense. Furthermore, desirable bounds for the infantry from crest to crest will not coincide with the preferred locations for antitank defense along the line of a stream or the forward edge of woods.

He concludes that antitank defense is primarily the task of division and corps reconnaissance detachments well equipped with antitank and antiaircraft weapons, and reinforced when necessary by infantry in trucks and mobile artillery.

(8) LE COMTE SCHLIEFFEN, ORGANISATEUR ET STRATÈGE. [Count Schlieffen, organizer and strategist.] (II) Major Courbis Chapter II of the study begun in the May issue.

(9) CONCENTRATION DU GROUPE D'OPÉRATIONS DES CONFINES DANS L'ANTI-ATLAS 1934. [Concentration of the border operations group in Anti-Atlas in 1934.] Captain Van Belle

A description of the concentration of troops in the Sahara for the pacification of a native uprising.

(10) LES STRATAGÈMES DE POLYEN (EXTRAITS). [Extracts from the Ruses of Polyen.] General de Bude

Selected examples of ruses practiced in ancient times.

REVUE MILITAIRE SUISSE (Switzerland)

By Major F. During, Infantry

April 1936

(1) L'EMPLOI DES TROUPES DU GÉNIE LORS DES INONDATIONS DE LA PLAINE DU RHONE. [The employment of engineers during the floods in the Rhone Valley, July 1935.] Colonel Schaffner

(2) LE CERVEAU DU RÉGIMENT. [Infantry command posts.] (I) General Clément-Grandcourt

In this instalment the author describes the allocation and distribution of work in a regimental headquarters.

(3) LA BATAILLE DES YEUX. [The battle of the eyes.] Captain Zimmermann

The campaign of 1859 in Italy was the last war in which two opposing forces were in full view of one another. The introduction of the rifle breech-loader increased the distance between them, while the invention of the smokeless powder and the Maxim gun made the battlefield a desert. Bright uniforms disappeared, troops dug themselves in, and the entrenching tool became the infantryman's second weapon. In modern warfare the soldier sees practically nothing. To enable the commander to carry out his duties he requires powerful optical instruments and specialized personnel; an intelligence and communications system with which he can obtain information; light machine guns and tanks and artillery. The author concludes his article with the axiom: "He who sees will gain the victory."

May 1936

(4) MATÉRIEL DU GÉNIE. [Engineer material.] Colonel Lecomte

(5) LE CERVEAU DU RÉGIMENT. [Infantry command posts.] (II) General Clément-Grandcourt

The author concludes his study on infantry command posts with this article, in which he deals with the tactical disposition for defense of the command post, concealment from view, defense against aircraft and other forms of attack.

(6) TRANSMISSIONS. [Communications.] Lieut. Colonel du Pasquier

The author discusses the communications system in the Swiss Army. In dealing with the communications system at general headquarters, Colonel du Pasquier brings up the mission of Lieutenant Colonel Hentsch, of

German general headquarters, at the battle of the Marne in September 1914. He clears Colonel Hentsch of all blame and states that the failure of the Schlieffen plan was due to an unsatisfactory communications system. According to the author, the blame must rest on those, who, at the most critical moment of the war, entrusted the decision to Colonel Hentsch.

RIVISTA DI ARTIGLIERIA E GENIO (Italy)

By Major F. During, Infantry

April 1936

(1) I CAPISALDI DELL'IMPIEGO DELL'ARTIGLIERIA NELLE NUOVE "NORME PER IL COMBATTIMENTO DELLA DIVISIONE." [The employment of division artillery in battle.] Colonel Marras

(2) ORIENTAMENTI PER LA GUERRA DI MOVIMENTO. [Orientation in a war of movement.] General Fautilli

(3) I COLLEGAMENTI DI UNA DIVISIONE DI FANTERIA NELL'AZIONE DIFENSIVA. [Communications system in an infantry division.] Major Cappuccini

(4) IL MATERIALE DA 75/18 PER BATTERIE SOMEGGIABILI E PER BATTERIE A CAVALLO E AUTOTRAINATE. [Material of a 75-mm. howitzer battery.] By "S.T.A.M."

The author discusses the characteristics of material required of modern division artillery. He refers to the Italian 75-mm. howitzer pack, horse-drawn and motor-drawn batteries.

(5) IMPRESSIONI DI GUERRA SUL FRONTE SOMALO. [Impressions of the war on the Somali front.] (I) Major Petroni

The author gives his impressions of the war on the Somali front. He finds that the main difference between the campaign against Mad Mullah thirty years ago, and the present war, is the use of motor transport in the place of camel transport. Without motors it would have been impossible to conduct operations on a large scale more than a short distance from the coast.

The supply of water and food formed the main problem in a country where water is scarce and food practically non-existent. Pumps and water tanks were used extensively. There seems to have been very little sickness among the troops and he praises the medical services very highly.

May 1936

(6) CONSIDERAZIONI SULL'IMPIEGO DELL'ARTIGLIERIA CELERE. [The employment of artillery of a mobile division.] General Gamerra

The main mission of the artillery of a mobile division, according to the author, is the immediate opening of fire against automatic arms, antitank guns, and tanks. Counter-battery should be the exception.

(7) IL TRAINO MECCANICO DELLE ARTIGLIERIE. [Mechanical traction in the artillery.] Major Cavalli

(8) SORGENTI LUMINOSE PER APPARATI FOTOTELEGRAFICI CAMPALI. [Sources of light available for photo-telegraphic work in war.] Lieutenant Puglisi

(9) IL RIFORNIMENTO DELLE MUNIZIONI SUL CAMPO DI BATTAGLIA. [Munitions supply in war.] Colonel Frondoni

The author has worked out the details for maintaining the supply of ammunition for the artillery of two divisions and part of corps artillery for a two days' battle.

(10) IMPRESSIONI DI GUERRA SUL FRONTE SOMALO. [Impressions of the war on the Somali front.] (II) Major Petroni

In this instalment, Major Petroni concludes his impressions of the war on the Somali front. He mentions some of the difficulties of keeping up the motor vehicles. Observation, even from aeroplanes, was always difficult. Wire telegraphy was hard to maintain, especially on account of the damage done by white ants. On the other hand, radio proved a success.

ROYAL AIR FORCE QUARTERLY (Great Britain)

October 1936

- (1) AIR STRATEGY. (Conclusion) Lieut.-General Golovine
- (2) THE MOBILE SQUADRON ON IMPERIAL ROUTES. Flight-Lieutenant Charles
- (3) BOMBER FORMATIONS
- (4) BRITISH FOREIGN POLICY SINCE WATERLOO. Major Pemberton
- (5) THE REAL FOUNDATIONS OF COLLECTIVE SECURITY. By "Arcadius"
- (6) ORGANIZING COLLECTIVE SECURITY. Wing-Commander Fulljames
- (7) AIR NOTES: ITALO-ETHIOPIAN CONFLICT

ROYAL ENGINEERS JOURNAL (Great Britain)

September 1936

- (1) THE PREPARATION OF ENGINEER EXERCISES WITHOUT TROOPS
- (2) SOME PRINCIPLES OF PROTECTION IN AIR RAIDS. Colonel Garforth
- (3) RAILWAY SURVEY IN TANGANYIKA TERRITORY. Captain Herbert
- (4) THE PROGRESSING OF PRODUCTION IN NEW AND REPAIR WORK. Lieutenant Walter
- (5) THE LAST DAYS OF AN OLD TURKISH BRIDGE IN PALESTINE. Lieutenant Myers
- (6) ARTILLERY SURVEY. Captain Wilson
- (7) A TRIP TO KABUL. Captain Edwards
- (8) THE ROYAL ENGINEERS AND ANTI-GAS DEFENCE. Captain Watkinson
- (9) MOTORIZATION AND BLOCKING OPERATIONS. Colonel Dennerlein

SANCT CHRISTOPHORUS (Germany)

By Lieutenant Colonel S.J. Heidner, Infantry

April 1936

- (1) DIE PANZERWAFFE IM AUSLAND. [The armored weapon in foreign countries.]

The author divides this subject into two parts: Tactics of Armored Vehicles, and Technique of Armored Vehicles.

I. Tactics of Armored Vehicles.—This part is a series of reviews of foreign press articles on motorization, the employment of modern armored vehicles, and prospects for new developments in mechanization. The following are summaries of a few of the important reviews from magazines not reviewed elsewhere in the Quarterly:

"Advance of Infantry Over Last 200 Yards."—The author of this article in "Krassnaja Swjesda" believes that to enable attacking infantry to advance over the last 200 yards, separating it from the enemy, a complete reorganization is necessary. He thinks that riflemen should be equipped with light semi-automatic rifles designed for maximum efficiency at 400 yards. In addition to three rifle companies and a machine-gun company, he wants the battalion to have a mine-thrower company and an antitank unit consisting of three antitank-gun platoons and a reconnaissance platoon composed of light reconnaissance tanks and armored cars.

"Motorized Reconnaissance Detachments of Infantry Divisions."—This article in "Przeglad techniczny," advocates the following for a motorized reconnaissance detachment of an infantry division: It should have great mobility and be able to operate independently at a distance of about 30 miles from its division. Its organization should be as follows:

- Headquarters—Armored car for commander; armored cars or motorcycles for remainder
- 1 signal platoon—3 radio sets on motorcycles, air liaison patrol, 2 motorcycles
- 1 motorcycle platoon for reconnaissance and security
- 1 platoon armored reconnaissance cars
- 1 company reconnaissance tanks
- 1 rifle company with a heavy machine-gun platoon, all on trucks

- 1 platoon light tanks
- 1 platoon artillery, 3 guns
- 1 platoon engineer and gas troops.

In general, the function of the detachment is reconnaissance and combat for seizing and holding important terrain. It operates in very close liaison with the aviation. It fights by striking quick surprise blows with its entire strength.

"Cooperation of Cavalry and Mechanized Units."—Under this title, "Krassnaja Swjesda" discusses the necessity for the close cooperation between cavalry and mechanized units in order to develop the maximum efficiency of each. In mobile warfare the mechanized unit works well to the front to penetrate the hostile security screen or to strike hostile columns by surprise, but to reap the full benefit of such actions the mechanized unit must be quickly followed by the cavalry.

II. Technique of Armored Vehicles.—In this part the author discusses recent technical developments in armored vehicle construction. The following is a brief summary of some of the interesting points discussed:

Perhaps the most outstanding technical improvement in tanks since the World War has been their increased speed. Most tanks now have more speed than they can use on the battlefield. At first it was necessary to sacrifice armor to gain speed. Now, however, tanks with high speed and with heavy armor are being built. The heavier armor is the necessary answer to the development of light automatic weapons with armor-piercing bullets.

The problem of safe observation for drivers and gunners of tanks has not yet been satisfactorily solved. Bullet-proof glass to close observation slits has been developed, but when this glass is struck it becomes opaque and must be changed. Periscopes partially solve the problem, but they too must be replaced when hit. The use of small observation turrets has increased the visibility of tanks.

Machine guns are still the principal weapons of tanks. To combat other tanks an armor-piercing weapon is necessary, but it is remarkable that many tanks are still built without a suitable weapon with which to combat other tanks of their own type. Among the tank weapons developed for combating other tanks are large-caliber machine guns and 37-mm. guns. The antitank gun should fire an explosive projectile; this requires a caliber of at least 20-mm.

World War experiences led the French to build heavy tanks. The idea being that the tank, by being made proof against small arms and light artillery fires and by having great obstacle-crossing ability, could be used to break through a strong stabilized position. France has several hundred of these tanks weighing up to 92 tons. They are not, however, entirely proof against light artillery.

As to the number of armored vehicles possessed by foreign countries, the author estimates as follows: Great Britain has 600 modern tanks and armored cars; France has 4500 armored vehicles of which a great number are World War Renaults; Italy, Japan, Poland, and Czechoslovakia each have several hundred tanks and armored cars; Spain, Sweden, and Belgium have a scant 100 each; the United States has 1000, but outside of a few experimental models they are all veterans of 1918; Russia probably has about 10,000 tanks.

(2) PANZERABWEHR. [Antitank defense.]

This is a short answer to some of the points discussed in the article, "Something About the Employment of Antitank Weapons," in the February 1936 issue of "Sanct Christophorus" (see Quarterly No. 62). The February article inferred that the regimental antitank companies were motorized merely because of a shortage of horses. This writer, on the other hand, insists that these companies must be motorized to be useful. His principal argument is that they must have at least the same mobility as the tanks they are to combat. The author of the February article places the guns of the company in firing positions 300 or 400 yards behind the front line. The author thinks they should be held under cover in rear of the front line and moved into firing positions by hand when required to go into action.

The final question discussed is whether or not antitank guns should be moved into firing positions during the night. The author remarks, first of all, that if at all possible the regimental antitank company should have the night for rest and for servicing its equipment. He believes that the movement of enemy armored vehicles at night will be limited to roads. Roads can be blocked by other means than antitank guns, and therefore he is of the opinion that it is not necessary to set up these guns in firing positions during the night.

May 1936

(3) DIE MOTORISIERUNG DER WELT. [Motorization of the world.]

Under this title there are published a number of reviews of foreign military press articles relating to recent developments in motorization. The following are summaries of some of the more interesting of these reviews.

Russia has introduced into her army large numbers of heavy "M 1" tanks. This tank has undergone extensive tests and may be considered as a typical modern heavy tank. It is armed with a cannon and a machine gun in the main turret and a machine gun in each of two side turrets. It has armor of from 22-mm. to 35-mm., and has a speed of about 28 miles per hour. The crew consists of six men. Each tank is equipped with radio.

According to press reports, Russia now has five tank regiments of two or three battalions each, twelve separate tank battalions, and twelve separate tank companies.

According to latest press reports, Rumania now has four tank regiments and Yugoslavia two such regiments.

Japan has introduced into her army a new medium tank, Model 94, of 14 tons. It has a speed of about 28 miles per hour, and is armed with a 37-mm. gun and machine gun in the turret and another machine gun in the body. Its armor is from 6-mm. to 12-mm. in thickness. For reconnaissance purposes the Japanese have adopted a Model 92, 3-ton tank. It has a speed of about 30 miles per hour, is armed with one machine gun in a 360° turret, and has 8-mm. to 14-mm. armor.

Italy has recently adopted a new light tank, the "Fiat-Ansaldo Model 33." It has a weight of 3 3/10 tons, a speed of 28 miles per hour, is armed with one machine gun, has an armor thickness of from 5-mm. to 13-mm., and a crew of two.

The Polish army has a new armored car, the "Ursus." It weighs five tons, has a speed of from 30 to 33 miles per hour forward and backward, is armed with a 37-mm. gun and two machine guns, and carries a crew of four.

The new Italian armored car, "Fiat Model 34," weighs 6.8 tons, has a speed of about 46 miles per hour forward and backward, has a 47-mm. gun and two machine guns in a turret, has 8-mm. to 13-mm. armor, and carries a crew of from four to five.

A new armored car, the "Landsverk 185," is being manufactured in Sweden for use in her army and also for sale to foreign countries. It weighs 6.2 tons, has 5-mm. to 9-mm. armor, is armed with a 20-mm. machine gun and two light machine guns, and carries a crew of from four to five.

According to reports from Switzerland, France is converting another cavalry division into a mechanized division.

Italy is reported to be using extensively in her army an armored, motor tricycle, the "Guzzi." The cross-country ability of this vehicle is greater than that of an automobile. This is accomplished by placing rubber chains on the rear wheels. These vehicles can be used for towing machine guns or antitank guns.

The "Madsen" works of Copenhagen have recently produced a 37-mm. antitank gun, projectiles of which will penetrate 61-mm. of armor with normal impact and 50-mm. with an angle of incidence of 60°.

(4) ZURÜCK ZUR INFANTERIE. [Back to the infantry.]

The author of this article, First Lieutenant Hoffman, reviews the difficulty that Germany had in developing armored vehicles and anti-mechanized defense during the period of her restricted armament. Dummy tanks built on automobiles or pushed by hand were used in maneuvers, but these could not give the same effect as a real tank. Realizing that tanks would be used in mass, antitank battalions and regiments were organized.

These operated in many cases under the control of higher units. The leaders of the tank units thus became interested in the tactics and the problems of the higher units. Lieutenant Hoffmann believes that with the constitution of the present antitank battalion as an integral part of each division, the attention of antitank commanders will be focused where it should be; that is, on the immediate protection of the infantry.

(5) DIE KRAFTFAHRKAMPFTRUPPENSCHULE IN WÜNSDORF. [The Army School of Mechanization in Wünsdorf.]

The German Army School of Mechanization was moved last year from Berlin to the little village of Wünsdorf, about 25 miles south of Berlin. At its new station the school will have ample new and modern buildings and sufficient terrain to carry out its varied activities. The instruction at the school is given in four sections:

Section A—Tactics

Section B—Technique and Mechanics

Section C—Marksmanship

Section D—Motor vehicle driving and experiment.

Section A gives three courses: a course for officers of the mechanized troops; a course for officers of other branches; and a course for officer candidates. Section B gives a course for officers of all branches intended to develop experts on motor transport, and of course for noncommissioned officers which deals principally with the care of motor vehicles. Section C gives practical instruction in marksmanship from mechanized vehicles. Section D gives practical instruction in driving mechanized vehicles over all types of terrain. The school department of experiment also comes under this last section.

June 1936

(6) MARSCH MECHANISIRTER VERBÄNDE. [Marches of mechanized units.]

This article is a translation from the Russian magazine, "Woina i Revoluzija."

General Principles.—In executing a march with a mechanized unit, consideration can not only be given to speed, but every effort must also be made to save the personnel from fatigue and the material from unnecessary strain and wear, in order to assure that the unit will at all times be in condition for combat. The marching capacity of a mechanized unit depends directly upon the proper functioning of the material and upon the supply of motor fuel. This makes the organization of an efficient up-keep and supply service essential. The direction of the march, its objective, and the enemy situation, all influence the measures to be taken for security, for reconnaissance, and for the organization and the dispositions of the march. In a march behind friendly troops, the question of security is of little importance while technical considerations are given first place. In a march toward the enemy, where contact is expected, the troops must be so disposed as to allow the whole unit to be instantly deployed for combat. Security against air attack and the necessity for rapid deployment demand march formations in breadth and depth.

Characteristics of the March of Mechanized Units.—Marches of mechanized units differ from those of foot or mounted troops, particularly in their greater speed, in that there will be more variation in the speed of the elements of the column, that is to say, an accordion action in the column, and that there will be greater depth to the march formations. Another characteristic of a mechanized march is that it is very dependent upon supply and terrain conditions.

The march rate of mechanized units depends upon a number of things, such as the type of vehicle, the condition of the roads, and the contour of the terrain. The training of drivers, the march formations, the time of day and year, and the weather conditions, all likewise have their effect on the speed. It may be assumed that in general mechanized troops march three or four times as fast as foot troops and at least twice as fast as mounted troops.

There is great difficulty in maintaining uniform speed in a long column of motor vehicles. When a leading vehicle of a column attempts to move

at a speed of about 18 miles per hour, for example, it is found that the fiftieth vehicle of the column has to vary its speed from 5 to 45 miles per hour. This arises from the difficulty of maintaining exact intervals and from curves, grades, and bad places in the road. To reduce this action mechanized units should march in many columns on a wide front and in each column vehicles should be organized into march groups with intervals between the groups.

The length of a mechanized column on the march is much greater than that of other units; for example, a rifle company on the march forms a column of 150 yards, but if such a company is placed in trucks the length of the column becomes about $\frac{1}{2}$ mile, an infantry battalion on the march forms a column of approximately the same length, but when placed in trucks the column is about 2 miles long.

The supply of motor fuel for a mechanized unit on the march is of greatest importance. When the enemy is met, it will usually not be possible to refuel. Hence, it is important that the tanks of all vehicles be as nearly full as possible at all times. A mechanized unit, if short on fuel, can not complete a partial victory by pursuing the enemy.

The condition of the roads has a much greater effect on the march of mechanized units than on that of other units. The author considers three types of roads: paved roads, improved roads, and unpaved roads. Main, paved highways allow greater speed and, on them, there is less chance of a unit losing its way. Such roads have the disadvantage, however, of causing caterpillar treads to wear out rapidly and, on account of the ditches usually found on each side of them, it is difficult for a marching unit to take cover from air observation when it wishes to halt. Unpaved roads have the disadvantage of being greatly affected by weather conditions. If they are secondary roads it may be easy to become lost on them, especially at night. Unpaved roads also consume motor fuel much more rapidly than paved roads.

The author estimates that a mechanized unit marching on good paved roads can make about 93 miles by day and 60 miles by night. On good unpaved roads he estimates 60 miles for a day's march and 37 miles for a night's march. On unpaved roads in bad weather he believes that these rates will fall to 25 miles for a day's march, and 12 miles for a night's march.

The distance between vehicles and between march groups is dependent upon such factors as the speed, the condition of the roads, the training of the drivers, and the efficiency of the brakes. In general, the distance between vehicles will vary from 10 to 80 yards, and that between march groups from 200 to 2000 yards.

Occasional long halts are necessary to rest the personnel, to inspect and overhaul the vehicles, and to refuel. A halt of from two to three hours is necessary for this purpose. Shorter halts of from fifteen to thirty minutes should be made every two or three hours for the purpose of inspections and minor repairs. One such halt should be made about three-quarters of an hour after the march begins.

Security on the March.—The strength of the security detachments depends on the objective, the direction of the march, and upon whether or not contact with the enemy is expected. If contact with the enemy is expected, the advance guard must be strong; in a retreat there must be a strong rear guard, and in a flank march a strong flank guard. The entire strength of the security detachments should not be more than one-third of the force nor less than one-ninth. The distance between the security detachments and the main body depends upon the size of the unit and upon the enemy situation. Normally the point will march from 1 to 2 miles ahead of the main body of the advance guard.

Antiaircraft Protection.—Mechanized units are particularly vulnerable to air attack when passing through defiles or crossing bridges. They may expect hostile aviation to attack with bombs, machine-gun fire, and chemicals at such places. Antiaircraft protection during the march requires the taking of proper precautions for concealment during halts, and the timely discovery of approaching hostile aircraft so that antiaircraft units may get into action and fire with maximum effect. Fog may conceal a march from

hostile air observation. The use of smoke to conceal a column is dangerous because it gives away the location of the column, and it is difficult to maintain a concentration of sufficient thickness to conceal the column from view of an airplane overhead.

Functioning of Supply Units During the March.—The supply of motor fuel for armored cars is not difficult. The combat trains for these units usually carry sufficient fuel for the unit for 280 miles, independent of the gasoline carried in the tanks of the vehicles. The fuel supply of tanks is a much more serious problem, since they consume fuel at a rate about six times that of armored cars. The combat train of tank units should carry sufficient motor fuel to half fill the tanks of the vehicles. As soon as the vehicles have consumed half the fuel in their tanks it should be replaced from the combat train which then, in turn, refuels from a supply train 6 or 12 miles in rear.

General Principles for the Execution of Marches.—As soon as a mechanized unit gets its orders for a march, a careful reconnaissance should be made of the routes over which the march is to take place. Such a reconnaissance should report on the probable speed that can be used on the roads, the condition of the bridges, the location of suitable places for covered halts, and the passability in general of the terrain alongside of the roads. The probability of meeting the enemy must always be considered. The organization and dispositions of the march must be such that the unit can promptly form for battle. If it is expected to fight a delaying action, artillery, antitank weapons, engineer and chemical troops should be attached to the mechanized unit. The march orders should contain the following information: The enemy; Mission; Neighboring troops; Security measures; Dispositions for the march; Initial point; Time when each column or march group begins the march; Intervals; Antiaircraft protection; Position of the commander; Special instructions such as signals or lights on vehicles.

In order that no wrong roads are taken, all the personnel down to the drivers should be given instruction about the roads that are to be followed. At critical points along the road the traffic should be regulated. The posting of signs along the road is useful, especially for vehicles that have to fall out, for any reason, and become detached from the columns. Motorcyclists should be stationed at important crossroads until the last troops have passed.

(7) **ABWEHR VON KAMPFWAGEN.** [Antitank defense.]

The author of this article comments on previous articles appearing in this journal on the subject of antitank defense. He agrees with the principle enunciated in the November 1935 issue of "Sanct Christophorus," that tank attacks are to be expected in very great mass. The object of such an attack will be a breakthrough. The attack will be organized on a comparatively small front but in great depth. Passive defensive measures cannot be expected to be effective against a tank attack in mass, because means of overcoming them will be on hand, as for example: pioneer tanks and amphibious tanks. The strength of a tank attack organized in depth, lies in the fact that the assault tanks will be continually reinforced by fresh waves from the rear. A tank attack of this nature will be initiated by an artillery preparation which will blind the enemy's observation posts and defensive works. The attack will also be supported during its progress by artillery on mobile mounts. The antitank weapons attached to an infantry unit cannot be expected to stop such an attack. If these weapons are to be in position to fire on the hostile tanks, they cannot be concealed and their crews can therefore be easily disabled by hostile machine guns.

The author believes that the infantry's best defense against hostile tanks will be some form of machine gun with armor-piercing bullets. Only that type of weapon will have a sufficiently rapid rate of fire to efficiently combat approaching tanks. The author does not agree with the article in the February 1936 issue of "Sanct Christophorus," regarding the placing in line of two companies of the division antitank battalion. He believes that all antitank weapons should be drawn by fast, cross-country tractors, and should be able to go into action rapidly upon the approach of hostile tanks. It takes little more time to put such a towed gun into action than

it does one fired from a self-propelled vehicle, and the former has the advantage of being less vulnerable and more accurate. Such guns should have a small shield for the gun crew.

(8) NEUES VON DER HEERESMOTORISIERUNG IN FREMDEN HEEREN. [Latest data relative motorization in foreign armies.]

It is known that Italy has used a number of her light combat cars "Fiat Ansaldo" to good advantage. Since they can negotiate a grade of 45°, they were particularly useful in the mountains of Ethiopia. These cars were organized into a "division" of three squadrons of fifteen cars each. The treads wore out rapidly due to the stony and sandy nature of the terrain. The Abyssinians had only a small number of 37-mm. antitank guns.

According to different press reports, mechanization in Russia presents the following picture. In every corps there is a tank regiment. In all, there are twenty-three tank regiments, representing about 3500 tanks. Of the infantry divisions, three are fully motorized. The reconnaissance detachments of the cavalry divisions, the heavy artillery regiments of the general reserve, and the engineer and chemical troops are all also fully motorized. The antiaircraft artillery, the corps artillery regiments, and the signal troops are partially motorized. Amphibian tanks are being used in large numbers. During maneuvers, scout car units of three amphibian tanks were successfully used for crossing streams which other tanks could not cross. During the fall maneuvers, large cavalry units and motorized units worked together. One conclusion reached during these maneuvers was that tanks should halt to fire in order to obtain better results.

The following additional data has been secured concerning the Swedish tank manufactured by the firm Landsverk, about which an article appeared in the preceding number. This tank has a weight of 11½ tons and is armed with a 37-mm. gun and two machine guns. It can cross a ditch of 1.8 yards and ascend a grade of 40°. Its armor is supposed to protect against all antitank weapons up to 500 yards. The tank has a radius of action of 87 miles and carries a crew of four. It is gas proof, the observation slits being closed with splinter-proof glass. There are available three telescopes for observation and for firing the weapons. All the vehicles are equipped with radio. The vehicles have convertible tread and wheel traction. It is reported that the crew can change from treads to wheels in eighteen seconds without coming out of the tank. These tanks have a speed of 46 miles per hour on wheels, and 25 miles per hour on treads.

The following additional data is given about the Japanese tankette, Model 92, reported in last month's journal: This little tank has a weight of only three tons. It is propelled by a 45-horsepower, four-cylinder, air-cooled motor, and has a speed of 28 miles per hour. It is armed with a machine gun in a turret. Its armor is 8-mm. The crew consists of two men. The Japanese light tank, Model 93, is armed with two machine guns. It is propelled by an air-cooled, six-cylinder motor of 85 horsepower, and has a speed of 28 miles per hour. It carries a crew of three men and all the vehicles are equipped with radio.

During the winter training in Poland, tankettes were used in connection with patrols on skis. The tankette served as a tractor for towing the patrols and, in addition, sheltered them from enemy fire. Russia carried out similar experiments. The riflemen were towed a distance of 23 miles to their objective and arrived there fresh and ready for combat.

The Austrian army is now also equipped with tanks. The type introduced in that army is the small "Fiat Ansaldo," very similar to that used by Italy. It is probable that this tank was purchased in Italy, although it may have been manufactured by the Steier Works. This little tank weighs 3.3 tons, has a speed of 25 miles per hour, armor of 8-mm. to 13-mm., is armed with a machine gun, and has a crew of two.

Sweden is trying out an armored car of original design. In this car even the wheels are protected by armor. One objection to this armor over the wheels is that it reduces the cross-country ability of the vehicle. This car is armed with a 37-mm. gun in the front of the body, one machine gun in the turret, and one machine gun in the rear of the body. Its armor has a thickness of 6-mm.

Czechoslovakia has introduced into her army a new model "Skoda P-A4" scout car. It has double steering at all speeds. The car weighs 8.7 tons, has 100 horsepower motor, and a speed of 38 miles per hour. It is armed with a 20-mm. cannon in the forward part of the body and two machine guns in the turret. It has 14-mm. armor, carries a crew of five, and has bullet-proof tires.

It has been left to Poland to bring music to the mechanized units. Several of the Polish battalions of armored cars have had assigned to them an armored car with a loud speaking apparatus in the turret arranged for playing phonograph records. It is the purpose of these cars to provide music for the mechanized unit while on the march.

SIGNAL CORPS BULLETIN

September-October 1936

- (1) THE THIRD CORPS AREA. Captain Bixby
- (2) THE THIRD CORPS AREA GOES "RADIO MINDED." Captain Bixby
- (3) COMMUNICATIONS FOR THE CIVILIAN CONSERVATION CORPS, THIRD CORPS AREA. Captain Skinner
- (4) A SIGNAL CORPS COMMUNICATIONS BUILDING. Lieut.Colonel Hart
- (5) SEACOAST DEFENSE COMMUNICATIONS. Captain Simmons
- (6) POWERS AND LIMITATIONS OF RADIO COMMUNICATION WITHIN A MODERN FIELD ARMY. Major Moran
- (7) EXIT "WAMCATS"—ENTER "ALASKA COMMUNICATION SYSTEM." Major Stoner
- (8) TEAMWORK IN COMMUNICATION. Major Clewell

VETERINARY BULLETIN

(Supplement to "The Army Medical Bulletin")

October 1936

- (1) DATA ON THE ITALIAN-ETHIOPIAN CAMPAIGN CONCERNING ANIMALS AND THE VETERINARY SERVICE
- (2) A RIVER CROSSING WITH TROOP F, TWENTY-SIXTH CAVALRY (P.S.). Lieutenant Boyce

WISSEN UND WEHR (Germany)

By Major G.J. Braun, Infantry

April 1936

- (1) GENERALOBERST VON SEECKT. [General von Seeckt.] General v.Haack, Retired

An eulogy of General von Seeckt, reviewing that part of his career when he organized the new German army to be "the best in the world."

- (2) DIE ZURÜCKNAHME DER 113. INF.-DIVISION HINTER DIE MARNE AM 19./20. JULI 1918. [The withdrawal of the German 113th Infantry Division behind the Marne on 19-20 July 1918.] General v. Bergmann

An abstract of this article will appear in the next issue of the Quarterly.

- (3) DER CHEMISCHE KRIEG IM SPIEGEL DES NEUEN AUSLÄNDISCHEN SCHRIFTTUMS. [Chemical warfare as viewed by foreign writers.] (I) Major General v.Tempelhoff

The author opens his article with the statement that more gas patients fully recovered after the war than did those wounded by shell fire. He then comments on the outlawing of poison gas from future wars by treaty. Captain Volkart of Switzerland says this is absurd since the agreement was never ratified by half the nations and history fails to show where any new lethal weapon was abandoned because of humanitarian ideals. No modern general would take the field without it.

All nations agree on the use of gas to (a) inflict mass casualties; (b) hinder the enemy's movements on the battlefield and its activity in the rear areas; (c) destroy the enemy's morale.

The author ends by discussing the means of dissemination of the gas by artillery, projectors, etc.

May 1936

(4) VON KRIEGSBEGINN BIS SKAGERRAK. ZUM 20. JAHRESTAG DER SKAGERRAKSCHLACHT. [From the declaration of war to the battle of Skagerrak. Twentieth anniversary of the battle of Skagerrak.] Admiral Gladisch, Retired

Twenty years after the memorable battle of Skagerrak we find that death has taken the great naval commanders of the opposing fleets, Admirals Scheer, von Hipper, Jellicoe, and Beatty. The major accomplishments and leadership of these commanders in this battle places them well beyond criticism for minor errors. The author carefully describes the responsibility of these commanders relative to risking battle, and the grave consequences should they be defeated. The maintenance of the offensive spirit which had been developed during the pre-war years became a problem for them during the period of watchful waiting for the opportune moment to give battle. The actions of these commanders were governed by the operative objectives of their respective fleets. The British objective was the domination of the high seas, the maintenance of her lines of communication with her colonies and Allies—especially with France, and to bottle up the German fleet. A naval battle was not considered imperative in the early stages of the war. Similarly, the German fleet was to avoid such a battle until its fleet could be brought to strength or the enemy lured to an area (such as around Helgoland) favorable to the German fleet.

The alternatives of close blockade, long-range blockade, or battle, all had their dangers. The close blockade would irritate neutrals against them; therefore the long-range blockade was decided upon.

The Allies planned on a long war with starvation of populace and denial of war essentials for the enemy as the object of their blockade; whereas the Germans were prepared for a short vigorous war with the decision to be gained on land. The Allies hoped that the eventual naval engagement would be the result of a German effort to forcibly break the blockade to reopen the high sea routes. To meet this the British strove to increase their naval strength by massing the Allied navies.

The author gives the events which led to the submarine warfare and its effect on the British navy and restriction of its movements. He devotes a chapter to Admiral Scheer and one to Admiral Jellicoe, and their aims and instructions. An excellent account of the naval battle of Skagerrak is presented by the author covering the engagement of the battle cruisers, followed by that of the fleet and the withdrawal of the German fleet through the British formation during the night.

During this battle, 37 British battleships were opposed by 21 of the German; and of the 176,165 tonnage which was sunk, 115,025 tons were British. The casualties were 6,094 British and 2,551 German sailors killed, and 674 British and 507 Germans wounded. The German ships rescued 177 British sailors; whereas the British lacked the opportunity to rescue any survivors.

A careful study reveals that the battle of Skagerrak made very little change in the relative strength of the two opposing fleets. This fight precluded the possibility of relief for the Russian allies by a breakthrough of the British fleet to the Baltic as well as further reinforcement of the allied Mediterranean fleets in the operations against Turkey or against the German North Sea coast line. Although the British press proclaimed the battle a victory, the populace and navy were disappointed in its outcome.

(5) DER CHEMISCHE KRIEG IM SPIEGEL DES NEUEN AUSLÄNDISCHEN SCHRIFTTUMS. [Chemical warfare as viewed by foreign writers.] (II) Major General v. Tempelhoff

Great significance is placed on the unanimous agreement by foreign technicians as to the use of combat chemicals by aviation in which more use is made of the spraying methods than by chemical-laden bombs. This indicates a trend to exclude the corrosive (irritating) and lachrymatory chemicals, using them for minor roles.

The suitable targets for spraying operations are listed as march columns, especially in defiles, troops in assembly areas or in the process of development prior to attack, bivouacs and rest camps, loading and unloading activities at railroad stations, staff headquarters, airdromes, arsenals, communications facilities and industrial centers. Troops in combat, due to their dispersion, offer less effective targets.

(6) ZUR STRATEGISCHEN VERTEIDIGUNG OSTPREUSZENS IM JAHRE 1914. [The strategic defense of East Prussia in 1914.] Colonel v.Strube, Retired

It is interesting to note the parallel between the beginning of field operations by Frederick the Great in 1757, when he left a fifth of his force in East Prussia for its protection, and the beginning of field operations of the German armies in 1914 when not quite an eighth of the armed German forces were detailed for this mission. Frederick permitted the loss of one province in order to gain a decisive victory on another front. The author feels that in 1914 the Germans should have sent but 6 divisions instead of 9 to the assistance of the Eighth Army. A defensive action would have been appropriate even though the province would have been lost. Germany also failed to maintain her fortresses, as planned by Count v.Schlieffen, as the basis for a defense of the province.

In 1759 the Russian army, consisting of 80,000 men and lacking the spirit of annihilation, started from a great distance. They were bent solely on territorial gain and to forestall Prussian influence in Poland and Sweden and prevent Prussia from becoming too strong as a power.

The situation in 1914 was entirely different. Due to the greatly improved rail net, a reorganized and greatly enlarged Russian Army, than that which participated in the Russo-Japanese War, moved rapidly with the latest powerful siege equipment to combat the German fortresses, endeavoring to force the Germans to an early decisive battle. Everything indicated that Russia would be able to fulfill her treaty obligation to France. It was feared at the time that the Eastern Front might become the main front, where the decisive battle of the War would occur.

This situation caused the Germans to decide on an active defense aimed to weaken the Russian forces before their complete concentration could be effected, thus enabling a tenacious delaying action later. Moltke's message of 14 August, to Count Waldersee, read, "When the Russians come, let there be no defensive—make it offensive, offensive, offensive."

The German Eighth Army, which contained many Landwehr units, was confronted by two numerically overwhelmingly superior Russian armies. Despite these odds the offensive was started, resulting in Gumbinnen, Masurian Lakes, and Tannenberg.

The author concludes with further comparisons of the problems of Frederick the Great, and those which confronted the German nation in 1914.

(7) BERUFSTÄNDISCHE ORDNUNG UND LANDESVERTEIDIGUNG. [Occupational regulation and national defense.] Major v.Vorwerck, Retired

A brief discussion of industrial regulation as it effects the social life of a community and national defense.

June 1936

(8) SCHARNHORST ALS LEHRER UND ERZIEHER. [Scharnhorst as instructor and educator.] Dr. Muhle

An eulogy of Scharnhorst who fathered military education for officers of the German Army. He advocated the policy that every officer be given the opportunity for the study of military science. Not only was Scharnhorst the author of military texts, but he also organized the military library for officers. The author states that the present impulse and desire for military education in Germany is along the lines taught by Scharnhorst. His policy that the army should represent the moral and physical strength of the nation has been carried out by Hitler.

(9) WICHTIGE FREMDE FLOTTENÜBUNGEN 1934/35. [Important foreign naval maneuvers of 1934-1935.] Rear Admiral Gadow, Retired

A resume of the British and American naval maneuvers.

(10) MANÖVER DER FREMDEN LUFTWAFFEN IM JAHRE 1935. [Maneuvers of foreign air services in 1935.] Lieutenant Nuber

A resume of the British air maneuvers of 22-25 July 1935 and September 1935; the French air maneuvers of 2-3 October 1935; the Italian air maneuvers of 8-9 August 1935; and that of the Russians, 12-15 September 1935.

(11) ENGLANDS STRATEGISCHE BAHNBAUTEN IM INDISCH AFGHANISCHEN GRENZGEBIET. [England's strategic railroad construction on the Indo-Afghanistan border region.] Reichelt

Section 5

Academic Notes

THE COMMAND AND GENERAL STAFF SCHOOL

REPRINT OF CURRENT SCHOOL MATERIAL, WHICH AFFECTS
INSTRUCTIONAL PROCEDURE OR TACTICAL DOCTRINES

Instructional Organization

Commandant

BRIGADIER GENERAL C.M. BUNDEL, U.S. ARMY

Assistant Commandant

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TERRAIN CORRIDORS

[1936-1937]

The factors which govern a commander's decision are:

1. The mission.
2. The tactical situation.
3. The terrain.
4. The will of the commander.

Colonel G.F.R. Henderson of the British Army, an acknowledged authority on Military History, states:

"I am inclined to think that the study of ground is often overlooked, and that by no means sufficient importance is attached to the selection of positions, * * * and to the immense advantages that are to be derived, whether you are defending or attacking, from the proper utilization of natural features."

The utilization of terrain obstacles is more important today than they were before, due to the development of tanks and mechanized and motorized forces.

Utilization of terrain, or taking advantage of the ground, together with its natural and man-made features, is generally understood when it is a question of small groups or individuals. The same basic ideas hold when considering larger units.

Both the attacker and the defender utilize the ground to favor the operations they have in view. In the offense, it influences the direction of march, the choice of objective, the scheme of maneuver, and the location and direction of the main attack. In the defense, it affects the choice of the position and the dispositions within the position. The attacker utilizes it to help avoid, or neutralize the fire-power of the defender and to break up the defensive organization. The defender uses it to assist in the organization of his defensive fire-power.

A *compartment of terrain*, or a *terrain compartment*, is an area which is enclosed on at least two sides by terrain features which limit terrestrial observation and direct fire into the included area.

The limiting features of a compartment may be ridges, woods, villages, or any other terrain form which affords defilade.

Compartments are classified according to their position and use, as

a. Corridors.

b. Cross-compartments.

A compartment is called a *corridor* when its general direction points toward the enemy, or when it leads in the direction of movement of a force.

A compartment which lies across the direction of movement of a force is called a *cross-compartment*.

Ridges, supplemented by woods and other limiting features, divide practically all terrain into compartments. These limiting features determine the general direction of the compartment. However, a compartment will usually contain within it other smaller compartments which have other directions. For example, a valley type compartment lying between two parallel ridges usually contains an axial stream with small tributaries. The draws or ravines formed by the tributaries form cross-compartments in the valley compartment.

In visualizing any military problem the corridor or cross-compartment must be considered in connection with the size of the unit whether it be a battalion or a division.

Now we will consider the tactical influence of corridors. From our definition, it is an area in which terrestrial observation and direct fire from without the area is limited. Thus, in the attack, it forms an advantageous avenue of approach. Troops within the corridor are defiladed from enemy weapons located outside the corridor, and the corridor limits terrestrial observation from without. This is of special importance since it limits the effectiveness of hostile artillery fire which is dependent upon this observation.

A unit attacking along a ridge is subject to direct fire and observation from the enemy's troops that are located in the two compartments on either side of the ridge. A unit attacking in a single compartment is subject only to direct fire from one compartment. Thus, it is seen, that in the latter case the volume of hostile fire is reduced.

In advancing in a single corridor, the attacker can concentrate his attention and power upon the neutralization of the direct fire and terrestrial observation within the corridor, and, being defiladed from without the corridor, has a relatively high assurance of success.

The attacker's observation extends forward in the direction of his advance. In attacking in a valley corridor the observation from the side ridges is advantageous. The attacker will endeavor to neutralize the hostile observation within the compartment and as the enclosing features cut off hostile observation from outside, the defender is hampered in bringing observed fire to bear on the attacker.

The upper end of a valley corridor usually is closed by a ridge which frequently affords commanding observation. The force which occupies this locality usually has better command than has its adversary. Generally the defender will occupy the upper end, since he usually selects his terrain, but if this is not the case, and if the attack can be directed downward along the general slope of the valley, the situation is especially favorable to the attacker.

A corridor extending into the defender's position is more advantageous to the attacker than one which just reaches it or stops in front of it, as it permits the attacker to observe and support his attack to a greater depth with less movement of his observation posts, and thus permits him to exert a more continuous pressure. Such a corridor affords the defense a greater length of side ridge from which observation can be used and may permit the use of observation posts deep within his position.

Tactics may be said to involve the skillful utilization of the terrain in order to bring superior fire-power to bear on the enemy. The factors concerning fields of fire as related to corridors are almost identical with those for observation. The defender is able to coordinate the cross fires of his machine guns within the corridor, and is able to deliver overhead fire from the side slopes. However, each compartment is more or less isolated, and fires from one compartment into another are difficult. The corridor permits the attacker to concentrate his fire-power within definite limits.

A valley corridor usually contains some trees or woods. These features afford cover, including some concealment from aerial observation, for the advance of the attacker. A corridor which is completely bare, offers favorable fields of fire to the defender and is less advantageous to the attacker than one which includes trees or other cover.

The obstacles most frequently found in compartments are streams located in valleys. In a corridor the main stream is usually located in the direction of advance. It may interfere with lateral communication and maneuver depending on the degree to which it is fordable, or it may have tributaries which form obstacles across the line of advance.

In general, the valley corridor provides some type of road running along it which facilitates communications for the attack.

From the above, it may be concluded that a corridor lying perpendicular to or piercing the enemy's position, usually implies a combination of terrain factors favorable to the attack in that it affords an avenue of approach and favors infiltration and penetration.

Unity of effort is absolutely essential in a military operation. This is obtained by coordination and cooperation of the subordinate units in

the command. Coordination is obtained through the system of command. Cooperation depends upon the separate wills of the subordinate commanders. When a subordinate commander is given a mission, he receives a responsibility which includes the full authority to control a given area. This area is designated by boundaries and the boundaries should be so located on the ground that there is no misunderstanding as to the division of authority. As boundaries tend to be areas of weakness, it is essential that they be designated so as to further unity of effort.

It has been pointed out that in the attack the corridor generally offers a favorable avenue of approach in that it limits hostile ground observation and direct fire, and permits the attacker to concentrate his effort. The ridges on each side of the valley corridor also afford him essential observation. Accordingly the boundaries of areas of responsibility naturally fall along the crests of the ridges on the sides of the corridor. If woods form one of the limiting features, the zone of action should include that portion of the margin of the woods from which the enemy can fire directly into the corridor. Boundaries are extended forward into the hostile position to include the terrain objective of the unit concerned, and are extended rearward to include essential roads for the movement of reserves and supplies.

We will now consider the tactical influence of cross-compartments which is a compartment lying across the direction of movement of a force.

Observation and fields of fire are practically continuous across the front throughout the length of the cross-compartment. This is a distinct advantage to the defender, for it permits him to concentrate observed artillery and infantry fires upon various parts of the front without changing installations. It also favors the development of a system of crossed flanking fires. In attacking a defensive position which has utilized a cross-compartment, the attacker has to neutralize a relatively wide front which usually has no definite limits on the flanks. Thus an attacking unit usually cannot neutralize all of the fires bearing upon it, but must depend upon adjacent units for assistance. Responsibility becomes less clearcut and more dependence must be placed upon cooperation between adjacent units.

The breadth of the cross-compartment, measured toward the front, usually limits the defender's observation and fields of fire. The attacker's observation and fields of fire are limited by the terrain feature which closes the compartment on the defender's side. Therefore, in so far as the effect of the attacker's weapons is concerned, his attack is well supported until it reaches that terrain feature, but the support thereafter suffers a material reduction in effectiveness until such time as the artillery observation and infantry supporting weapons can be moved forward to command the next succeeding compartment.

Successive cross-compartments in rear of the initial position afford the defender observation and fields of fire for successive defensive positions, for covering detachments in case of a withdrawal, for successive positions for retrograde movements, including delaying positions and rear-guard positions.

The limiting feature on the defender's side of a cross-compartment affords cover to his troops. He is able to maneuver his reserves and to maintain his rear installations with relative safety until the attacker passes beyond this terrain feature. The attacker is afforded cover for his initial dispositions by the limiting feature on his side of the cross-compartment, but as the attacker crosses the crest of the ridge or emerges from the forward limits of the cover afforded by this feature, his forces, especially tanks, may be exposed to observation and fire.

It was pointed out in the case of the corridor that the axial stream may interfere with lateral maneuver. In the cross-compartment the stream is located across the direction of advance of the attacker, and its influence as an obstacle constitutes one of the great advantages of the cross-compartment to the defense.

From the discussion it may be concluded that the cross-compartment usually implies a combination of terrain factors favorable to the defense and unfavorable to the attack.

In the defense, as discussed in the attack, when a subordinate commander is given a mission, he receives a responsibility for a certain area.

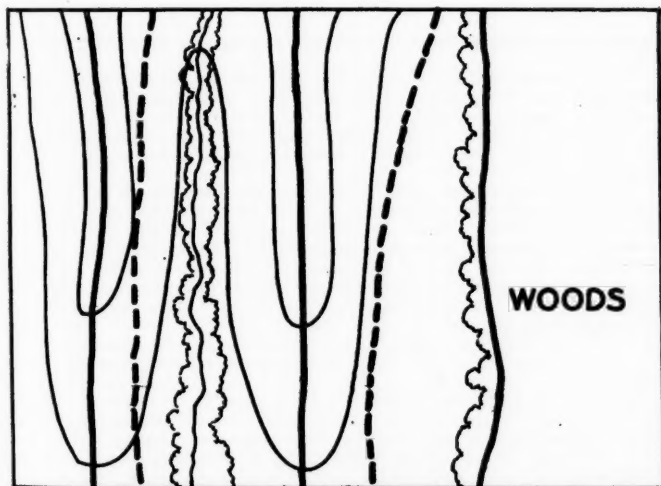
Boundaries, again, should be so located that there is no misunderstanding as to the division of authority.

The defense is built around a series of tactical localities the retention of which will insure the integrity of the position. Usually these localities will include the high ground which will afford observation and command of the attacker's approach. One commander should be in charge of each front-line locality. Since the localities usually include the high ground for observation, the boundaries will usually fall between the higher places, or within the valleys. If one commander is responsible for holding a given locality, he should have the responsibility for defending the routes of approach to it. Thus the commander who would be most menaced by a penetration between these localities should be assigned the responsibility for defending the approaches that are most liable to be used in attacking him. This means that usually the boundary will not fall down the middle of the valley, but along one or the other side slope of the valley.

The axial stream with its usual fringe of woods constitutes a smaller avenue of approach within the valley corridor. There should be no question of responsibility for this area and it should not be used as a boundary. Moreover, it is preferable that the boundary be placed upon open terrain forming a good field of fire for mutually-supporting cross fires. These reasons reinforce the conception of placing the boundary along the slope of one of the ridges enclosing the valley.

Similar reasons indicate that, in the defense, it is usually preferable to avoid placing a boundary within a woods or village.

ENEMY



LEGEND: ———BOUNDARIES FOR ATTACK
-----BOUNDARIES FOR DEFENSE

So far we have considered only a single tactical locality defending one shoulder. It is absolutely essential that both shoulders be held in order to limit a penetration up the corridor. From a study of the possible attack corridors priorities can be assigned approaches. It is obvious that the units defending the shoulders of the more dangerous approaches should be linked together under a higher commander in order to obtain unity of effort.

Shoulders on each side of such a corridor should be part of the next higher tactical unit and boundaries of command areas for higher units assigned accordingly. Thus the areas of platoons on very small shoulders are combined in company areas to bar the approaches between these shoulders; company areas are combined into battalion areas, etc.

At longer ranges to the front, it frequently occurs that the ridge formation is such that both of two support units can not fire effectively on the same side of the ridge. Also, at the longer ranges, the boundaries are intended primarily to coordinate artillery fires and will be influenced by the location of possible enemy assembly areas and routes of approach. These factors indicate that, at longer ranges, the boundaries will frequently fall along the crest of the ridge. The extension of the boundaries to the rear of the position are largely influenced by the location of roads which are needed for the movement of supplies.

From a consideration of the effect of terrain compartments on military operations the following, in general, may be concluded:

a. In the attack look for a corridor leading into the hostile position which will assist in seizing a decisive objective, and remember that boundaries, in general, should be arranged so as to include within each zone of action those localities from which hostile observation can observe and hostile fire by direct laying can be placed upon the path of the maneuver.

b. In the defense look for a cross-compartment preferably with an obstacle which can be covered with observed fire, and remember that boundaries of command areas should be laid out so as to obtain unity of command of tactical localities occupying key points on the shoulders of most dangerous avenues of hostile approach.

GENERAL PRINCIPLES ON RECONNAISSANCE AND SECURITY*

The development of aviation, of motorization and mechanization, of toxic gases and the power and range of modern weapons, with the corresponding changes in organization and tactical doctrine, is forcing upon the armies of the world a modification of their conception of time and space and a change in their ideas as to adequate reconnaissance and security measures.

The continuous front in the World War inevitably made of secondary importance the attention paid to the security measures which are so important in open warfare. With divisions, corps, and armies maintaining a permanent and close contact with one another, little anxiety was felt for the flanks or for the lines of communication. In any situation, a body of troops covered by advance, flank and rear guards pushed out to light field gun range, considered themselves relatively secure. But the day is past when such measures can be relied upon to give protection to the main body. Today the enemy can intervene at much greater distances, by air as well as by land, and in a much shorter time. Distance alone is not security.

The following is a discussion of the various security measures which it is believed must be employed by a marching force, or a resting force, under present-day conditions, and how the development of modern tactical doctrine, as taught at this School, influences reconnaissance and security measures.

(*NOTE.—This is the first of two articles on the general principles of reconnaissance and security as taught at The Command and General Staff School through the medium of map exercises. In these exercises a general tactical situation, e.g., the advance of a division is given; and then the student is carried through a series of special situations, which bring out the application of all the principles covered in these articles. The second article will appear in the next issue of *The Command and General Staff School Quarterly*.—Editor.)

Our text defines *reconnaissance* as "the operation carried out for the purpose of gaining information of the enemy, the terrain, and the resources of the area of operations."

The information gained by reconnaissance serves two purposes: First, it is *the basis of the commander's decision*, because the correct and timely decisions by the commander for the employment of his forces depend on the adequacy, correctness, and timeliness of the available information of the enemy and the terrain. Such reconnaissance discovers by positive means the relative combat value of the opposing forces, those enemy capabilities which affect the accomplishment of the mission, the extent of such effort, and, at times, the enemy's future action. Second, it affords *security*. "Security," according to our new text, is "the all around ground and air protection of a command by the adoption of effective measures to prevent surprise, observation, and interference by the enemy." This security seeks to:

1. Afford to the troops and other elements of the command actual physical protection against surprise and losses, and from all manner of hostile threats from air or ground.

2. Aid the morale of the command by promoting a sense of safety.

3. Guarantee to the commander freedom of action in executing his decision and his scheme of maneuver.

4. Prevent the enemy from ascertaining his strength and dispositions.

5. Insure the rapid and continuous movement of the main body in the march columns up to the point of contact, and then guarantee the time and space to change from a march to a combat formation or vice versa.

Reconnaissance and security go hand in hand. Security is based on thorough reconnaissance. The purpose of reconnaissance is to secure information. Information is the first line of security. Certain units of a command are charged primarily with reconnaissance, others with security, some with both.

Security is as old as warfare; but the methods of its application change and develop to fit the age, the means, and the range of weapons. The necessity for security is basic in every action in war from the time of the first possible encounter to the final battle, and the idea must at all times be uppermost in the minds of the commanders of all echelons from the highest to the lowest.

Irrespective of the manner in which a force moves—foot, horse, or motor—its freedom of maneuver, as well as its mobility—either strategical or tactical, is essentially dependent upon the state of security in which the movement is carried out. No matter how modern may be our division, its ability to change formations from a halt or its mobility while on the march are both decreased in direct proportion to its lack of adequate security. The faster the main body moves, the more limited the time and the more difficult it becomes to give it adequate security.

How Security Is Obtained

In addition to information obtained by *reconnaissance*, security for a command may be obtained by the following means:

1. By *information* that may be obtained to a certain extent prior to the commencement of hostilities, by an efficient espionage service, and by the various intelligence agencies.

2. By the use of *security forces* so disposed that they will be able to ward off enemy efforts to observe, surprise, and annoy the main body; prohibit enemy attempts to ascertain our location, strength, composition, and intended line of action; and guarantee to the commander the *time* necessary to adopt formations suitable to oppose the known enemy situation, and the *space* required for the resulting maneuvers. These forces may include mechanized cavalry, motorized formations, horse cavalry, reconnaissance detachments, advance, flank, and rear guards, and local security detachments.

3. By *adopting anti-aircraft, anti-tank, and anti-gas measures*.—a. Anti-aircraft protection includes formations which will limit vulnerability to attack from the air, the use of anti-aircraft artillery, and the coordinated effort of all units organically able to protect themselves.

b. Antitank measures include the use of special antitank units, a consideration of the employment of weapons organic in any command, the use of demolitions, artificial obstacles and defended road blocks, and taking advantage of natural obstacles.

c. The possibility of air attack by chemicals as well as the necessity for entering gassed areas must always be considered. To combat this, the wearing of protective clothing and gas masks may be necessary. Constant reconnaissance for gassed areas or gas carried by wind is necessary.

4. *By rapidity of movement.*—The less time spent in a movement, the more secure the command is likely to be.

5. By adopting *flexible formations* for the main body at the halt and on the march which will facilitate maneuver from a march or halt to a combat formation; or from a combat formation to a halt or a march, either forward or to the rear.

6. By the *utilization of terrain*, including artificial obstacles such as demolitions, road blocks, and the employment of gasses.

7. By insistence on absolute *secrecy* of the intentions of the commander, the use of *camouflage*, and all methods and means of *deception*.

To carry out secrecy the commander should divulge his intentions only to the commanders and staff officers whose cooperation is requisite to his plan. No orders should be given to subordinates that do not directly concern them. Orders should not be issued too far in advance.

Secrecy can also be maintained by moving at night or during periods of low visibility and by using concealed bivouacs.

The use of camouflage will aid materially in preserving secrecy and hence security in any situation.

Deception and false preparation should always be employed whenever possible.

SECURITY OPERATIONS

The security operations of a command may be divided into two distinct phases: the information or reconnaissance phase, and the combat phase.

1. The *reconnaissance phase* embraces all activities of information agencies which seek to furnish to the commander information of military value.

2. The *combat phase* begins when it becomes necessary to interpose combat elements between the enemy and the major units of the main body to give freedom of maneuver to the commander and physical protection to the troops. This phase includes measures taken for security on the march, security at the halt, security in attack, security in defense, and security in other operations.

Information is the vital link in the relations of the opposing forces. Effective reconnaissance determines at an early hour those hostile activities which may constitute a threat or hinderance to the development of the operation. In accordance with this information the commander is able to dispatch security detachments which prevent any interference for the required length of time.

The Reconnaissance Phase

1. **RESPONSIBILITY FOR RECONNAISSANCE.**—a. The commander of each unit has the responsibility for the maintenance of reconnaissance for such information as will influence his own operations or which is required of him by the higher commander. The detailed preparation of plans and orders for reconnaissance is the function of the staff, primarily of the G-2 (S-2) section. The execution of the reconnaissance is the task of the operative agency, an element of the command.

b. *Personal reconnaissance.*—The commander, or a member of his staff, frequently makes a personal reconnaissance for information which is essential to a correct decision. This reconnaissance usually seeks to determine the nature of the terrain over which it is contemplated launching an attack, or over which the enemy attack is expected. The most suitable means of transportation are utilized, considering the situation and the exact purpose

of the reconnaissance in question. Frequently the reconnaissance will be by airplane.

2. INFORMATION REQUIRED.—*a. Nature of information.*—(1) Reconnaissance agencies seek to determine facts relating to the strength, composition, location, movements, dispositions, organization of the ground, armament, equipment, supply, tactics, training, discipline, morale and condition of such hostile forces as may affect the accomplishment of the mission or the security of the command. They also seek such information of the terrain as will affect the operations of the opposing forces. These various items, in possession of the G-2 section of the staff, are classified, evaluated and interpreted, resulting in an estimate of what the enemy can do; where, when, how, and with what effect he can do it. Sometimes the enemy's most probable action can be determined.

(2) The more nearly complete the information of the enemy and the terrain, the more suitable can be the decision. The inability to determine all items of enemy information forces the reconnaissance to be concentrated on those which are essential to the decision to be made. These items generally relate to the location, movements, dispositions, strength and composition of the enemy. The other items are discovered incidentally. In a specific case any item may be sought.

(3) Negative information relating to the presence or movements of the enemy is important. It reveals the limitations on the enemy capabilities and those localities free for the maneuver of one's own force.

b. Time and space factors.—(1) Based on such information as is available, the commander initiates an operation, the first step of which is his decision. It is obvious that there are certain lines of action open to the enemy which may affect the accomplishment of the immediate mission of the commander. Therefore, corresponding to each decision are certain essential elements of enemy information which the commander must have in order to conduct further operations, and to accomplish his mission in spite of the enemy. These essential elements of enemy information will usually be in the form of inquiries concerning which of his capabilities the enemy will put into execution. Subsequent changes in the enemy situation may cause minor, and occasionally major, variations in the operation, each such variation beginning with a new decision by the commander. In such cases enemy action and our own reaction should occur as nearly simultaneously as possible. If enemy information warranting a change in our dispositions becomes known to the commander too late there may be insufficient time in which to execute an otherwise correct decision, and thus the troops may be endangered or an important opportunity lost. Likewise, if a decision is based upon obsolete information, a subsequent change in the enemy's situation may cause the decision to be incorrect.

(2) Exact coincidence is impossible because of the period required by the reconnaissance agency to acquire and transmit the information, and by the G-2 section to convert it into military intelligence suitable for the use of the commander. The reduction of the time loss to the minimum requires the following precautions:

(a) Within the capabilities of the reconnaissance agencies at his disposal, or by means of information received from higher or adjacent units, the commander establishes contact with a hostile force as soon as it comes sufficiently close to be able to influence the accomplishment of his mission or the safety of his command. This establishment of contact implies that some degree of surveillance must be maintained to the distances and in localities involved prior to the appearance of any enemy force therein.

(b) Hostile forces, having entered the area where they are able to influence the operation, may eventually reach a point where the commander must make a definite decision to meet the opposition. This decision involves either sending out a security detachment or a change in his own scheme of maneuver.

Between the point where the commander must make a decision and that where initial contact is established there is a gradual accumulation of information by reconnaissance agencies. This information serves as a basis for formulating tentative plans. The final information which immedi-

ately precedes and in certain cases, actuates a decision, will consist merely of a few items. If practicable it is confined to those items indicating where the enemy is at a given time, what he can do, and what he is doing. The point at which these final elements of information must be obtained must be at such distance that the command will have time to execute the decision correctly before the enemy action becomes effective. This distance can be reduced in the proportion that the nature of the terrain or the action of detachments delays the enemy, and that the means of communication expedite the transmission of the information. To further facilitate the rapidity of handling of information the G-2 section evaluates it as soon as received and is able at any time to give a complete and accurate summary or estimate to the commander.

(3) If, in any situation, it becomes impracticable to secure adequate information before the hour it is desired to initiate a particular operation, then the commander must decide whether to:

- (a) Act on insufficient information, or
- (b) Remain inactive while seeking to clarify the situation by additional reconnaissance.

The first of these plans is employed if the need for rapid action is so great as to overcome the serious risk involved. The second plan usually requires the reinforcement of the reconnaissance agencies, or may necessitate offensive action by a considerable part of the main body. The danger of such reconnaissance in force is that it may draw the entire command into battle without proper coordination or plan. In executing a reconnaissance in force the exact information needed should be definitely designated and the action of the reconnoitering force limited to its acquisition. As far as practicable in this action there should be employed a minimum of infantry or other elements which must enter into close contact. A maximum reliance should be placed on fire support by artillery and other weapons.

c. Time and space factors: specific tactical situations.—(1) *The advance by bounds.*—Sufficiently early to permit the issue of proper orders before the bound is to commence the commander should have enough information to know whether or not his command can reach the next march objective unopposed by relatively strong forces, and in either case, to decide whether and how to continue the advance, to act offensively or defensively, to change direction, or to retire. The commander must receive the final information on which he takes action while the enemy's march time to the next objective is greater than that of his own force plus the time required for transmission of orders and the time required for transmission of information. All of the reconnaissance agencies needed to obtain this information must be operating in advance of the command at a minimum distance equivalent to the sum of all of these.

(2) *Security.*—Reconnaissance agencies whose reports permit the proper employment of security detachments must operate at a distance beyond the point where the threat is to be opposed equal at least to the sum of the distances the enemy can advance during the time required for transmitting the information, and the time required for executing the security action. Because of the great mobility of hostile air, mechanized, and motorized forces reconnaissance for security must be maintained in all directions and to much greater distances than when opposed by horse and foot elements.

(3) *Other situations.*—By the time close contact has been established all reconnaissance agencies are in operation. Continuous reconnaissance seeks to discover pertinent developments of the enemy situation as soon as they occur.

3. RECONNAISSANCE AGENCIES.—*a.* Each element of the command which possesses means of securing information of the enemy is a reconnaissance agency and is utilized in accordance with its characteristics.

b. Air service.—Observation aviation, because of its great speed and radius of action, covers broad and deep areas providing the most distant reconnaissance. It can reach any desired observation point in short periods varying from a few minutes to three hours. It is not affected by hostile ground covering forces. Its methods of operation include day and night visual and photographic reconnaissance. It is the principal agency for

seeking information within the enemy lines, for quickly verifying reports of enemy activities, or for meeting emergency needs for reconnaissance at a distance. It can discover the location, movements, and frequently the composition of hostile forces in open terrain in daylight. Photographic reconnaissance discloses details of ground organization. The effectiveness of the air service is restricted in varying degree by inclement weather, darkness, anti-aircraft fire, hostile combat aviation, covered terrain, and inexperienced observers. In exceedingly bad weather the observation airplanes may be unable to operate. Air observation is intermittent, cannot guarantee the correctness of negative information and cannot obtain identifications.

c. Cavalry.—(1) The cavalry (horse and mechanized) establishes and maintains contact with the hostile forces. Whether this contact is with the hostile covering forces or with the main body will depend on the ability of the cavalry to break through the hostile covering forces. By means of visual observation, combat, prisoners, or other means of identification, captured documents, and contacts with local inhabitants the cavalry seeks to determine specifically, those items it is directed to obtain, and incidentally, all other enemy information of whatever nature, the acquisition of which does not interfere with the assigned mission. The cavalry cannot be expected to gain information within the area occupied by strong hostile forces, except such as may be obtained by its attached air service.

(2) Armored cars and scout cars, operating rapidly on roads in relatively large areas, gain negative information and positive information of a general nature. They can maintain contact with mechanized or motorized units. Because of their relatively low mobility off roads their ability to secure details of information in occupied localities is greatly restricted by properly located and defended road blocks. When detailed information is required the cars must be supported by combat elements able to maneuver cross-country and to overcome local resistances.

(3) Mounted detachments and patrols must be employed when detailed information is desired or when the nature of the terrain is such that the cars cannot operate effectively. These mounted elements usually become essential when the opposing forces enter into close contact.

(4) The main body of the cavalry, whether composed of mechanized or mounted units, acting on the information gained by its reconnaissance agencies, seeks to gain contact with the hostile main body by overcoming the resistance of the enemy cavalry and covering force detachments. Mechanized units (regiments and larger forces) are powerful self-contained combat groups capable of reconnoitering far in advance and well around the hostile flanks. They are seriously restricted by obstacles such as streams, thick woods, and rugged terrain. A continuous supply of fuel is essential. Mounted units initially gain contact with the hostile front and, to a lesser degree, around the flanks. This contact is maintained until the reconnaissance agencies of the elements of the main body are able to take over the reconnaissance. The mounted units are much more restricted in their rate and distance of movement than the mechanized units, but are less influenced by the difficulties of the terrain. The availability of water is a primary consideration in the employment of these units. Armored cars and scout cars are organic parts of the more important mounted units.

(5) All cavalry units execute reconnaissance missions most effectively in daylight. Efforts to gain contact or to act aggressively after contact has been established are usually performed during the day. The nights are used for rest, with the forward elements maintaining observation at suitable points on the principal routes.

d. Infantry.—The infantry conducts the close reconnaissance essential to its local security and proper employment in battle. This reconnaissance is primarily the responsibility of the subordinate infantry commanders, but is of assistance to the commander in determining the exact configuration of the hostile front and dispositions when in close contact. Motorized infantry elements may frequently be used to reinforce the combat action of cavalry in overcoming local resistances, and, in the absence of other means of reconnaissance, must be used alone to obtain essential distant information. A portion of the infantry, adequately supported by artillery and other

auxiliary arms, may be employed in a limited objective attack to obtain information not available by any other means.

4. **TECHNIQUE GOVERNING THE EMPLOYMENT OF RECONNAISSANCE AGENCIES.**—*a.* Each reconnaissance agency should be employed in accordance with its characteristics and with its capabilities as they exist in the particular situation.

b. The air service seeks the initial contact with the enemy and indicates the directions and objectives for the reconnaissance by the cavalry.

c. The bulk of the cavalry is directed primarily at those known hostile forces of which detailed information must be secured. Such forces are usually those which must later be engaged in combat.

d. Secondary cavalry reconnaissances may be maintained in important unoccupied areas where enemy forces may be expected to operate later. This mission is usually performed by armored or scout cars if the terrain is suitable.

e. Motorized infantry and truck-drawn artillery should reinforce the cavalry when additional combat strength is required.

f. Subordinate units which lack necessary organic reconnaissance agencies should be given such agencies by attachment to meet the needs of the situation. This attachment may include elements of:

Division cavalry to infantry columns;

Army or corps cavalry to corps or divisions, respectively;

Corps air service to divisions.

Such attachments should be held to the minimum required by the situation.

g. The assignment of a reconnaissance mission should take into consideration the risk involved in the possible isolation of the reconnaissance agency. This fact applies particularly to the assignment of missions to small mounted detachments operating at such a distance that they are liable to be cut off by enemy cavalry. It also applies to operations of mechanized units in terrain poorly suited to their movements.

h. To avoid duplication of effort areas or zones of responsibility may be assigned to the different reconnaissance agencies. Zones are frequently assigned to detachments and larger forces of cavalry. In large forces of all arms (corps and army), whose principal subordinate elements have organic reconnaissance agencies, a reconnaissance line is designated. This line marks the limit of reconnaissance responsibility between the higher and lower unit. The line should be marked by easily located terrain features such as roads, streams, railroads or important localities. The subordinate unit reconnoiters outward to this line, the superior unit beyond it. Either may reconnoiter across the line if it deems it necessary. During an advance the corps reconnaissance line is advanced from day to day so that, prior to the commencement of each march stage, reconnaissance by the divisions has explored in advance to a distance equal to at least a two-day's march. To take full advantage of the air service the line is advanced at or shortly after daylight. The cavalry elements commence their advance at that time, reaching the new line during the day. If the advance is made by night marches the line is advanced on the day the march stage commences. If the advance is made by daylight marches the line is advanced the morning prior to that on which the march stage commences.

i. Reconnaissance missions should definitely state:

(1) The specific information desired.

(2) Where it is to be sought.

(3) When it must reach the commander.

5. **PROCEDURE.**—In preparing plans and orders for reconnaissance agencies the following procedure is employed:

a. The commander announces a decision and plan.

b. The G-2, with the approval of the chief of staff, designates the essential elements of enemy information.

c. The G-2 prepares the G-2 plan for the employment of the reconnaissance agencies. The preparation of this plan requires close cooperation with G-3. Once the forces are in close contact a portion of the available

airplanes must be diverted to missions other than those pertaining to G-2 reconnaissance. At any time the bulk of the cavalry may be required for delaying action, counterreconnaissance, or other mission which prohibits its primary use for reconnaissance. Reinforcements for the cavalry are arranged with G-3. The chief of staff settles any disagreement arising as to the employment of the air service and the cavalry, and approves the G-2 plan.

d. The necessary orders are issued in the simplest, quickest, and most effective manner.

The Combat Phase

As the main bodies get closer, the information, or reconnaissance phase, gradually merges into the combat phase and includes those units or detachments which are charged with the physical protection of the main force. For example, the cavalry may change from protection by reconnaissance to protection by combat. There is this fundamental difference between reconnaissance and security forces—reconnaissance agencies are oriented with respect to the enemy, while security forces are oriented with respect to our own command.

The security measures adopted in any situation may include all of the means enumerated above. However, normally there will be three contingencies:

1. *Security when beyond striking distance of enemy's main forces.*—A force beyond the striking distance of the enemy's main forces is not likely to be subjected to the coordinated attack by infantry supported by other arms. Such a force, however, will be subject to air raids, using bombs, machine guns, or gas, raids by armored cars and tanks, and by completely mechanized forces, by troops brought forward under cover of darkness in mechanical transport (either air or motor).

Under these circumstances, it is the duty of the security agencies to:

a. Furnish information regarding the resources, communication, and tactical features of the country within the theater of operations.

b. Supplement, as required, information about the enemy obtained by espionage or by special reconnaissance agencies.

c. Take positive measures to prevent the enemy from obtaining information regarding the intentions or movements of our own force.

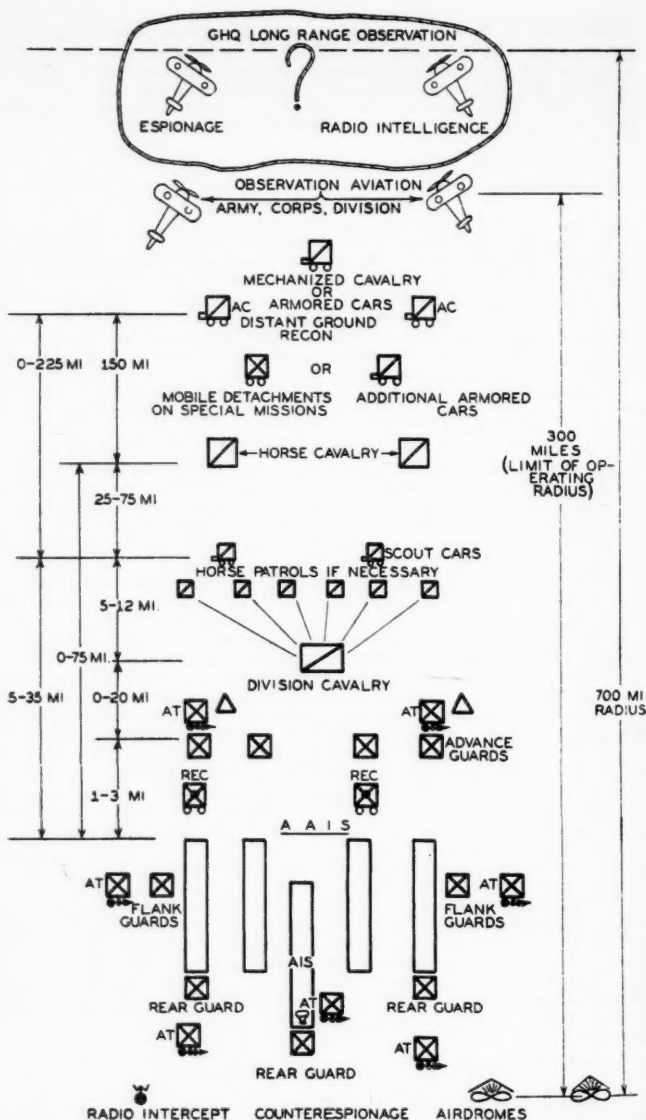
2. *Security when within striking distance of the enemy's main forces.*—An independent force within striking distance of the enemy's main forces is liable to attack by long-range artillery fire, infantry supported by artillery, as well as by all of the other means enumerated above.

It now becomes the duty of the reconnaissance and security agencies to furnish the commander with sufficient detailed information concerning the enemy forces to enable him to make his preliminary dispositions and plans and evolve a scheme of maneuver. This will involve offensive action and the reconnaissance agencies must be supplemented by other advanced troops as the situation requires.

3. *Security during battle.*—When two forces finally come into close contact, each will be deployed on its battle frontage and will be maintained in a state of complete readiness for action; the power of maneuver becomes limited; each unit of the mass protects itself; and the special protective troops take the necessary measures to protect themselves against surprise and at the same time continue their missions of keeping touch with the same or other enemy elements and keeping the commander informed of their movements.

Depth of Reconnaissance and Security

It is seen that the zone of security of a command must include not only the depth of its march stage but must extend from the maximum radius of action of observation aviation, through successive radii to the immediate local security of the smaller units of the main body. It must include the entire radius of action from which the force can be menaced by the enemy.



DEPTH OF RECONNAISSANCE AND SECURITY
(BEFORE CONTACT IS GAINED)
NOTE AT TIMES THIS WILL APPROXIMATE ALL AROUND PROTECTION

The role of distant security is surveillance of the avenues of approach available to the enemy by aviation supplemented by distant ground reconnaissance agencies.

Within the perimeter in which the distant ground reconnaissance agencies are working, there is a field of action for highly mobile detachments sent out by the force commander on special missions, such as to delay, disrupt, and harass the hostile force, to deny him important terrain, to intercept and delay forces which have eluded the distant security elements, or to seize and hold advanced terrain features, or deny their occupation to the enemy until the main body arrives. These detachments act as general security forces for the entire command. They may be given the mission of reinforcing the operations of the distant reconnaissance and security agencies.

Still closer within the area surrounding the main columns will be forces more closely coordinated with the advance of the main body, such as advance, flank, and rear guards, outposts, reconnaissance detachments, and antitank units. The functions of these elements are primarily tactical in nature in that they bear a direct relationship to the immediate operations of the main body.

The specific provision for close-in local security detachments by each unit of the main body completes the protection afforded by all other elements and insures the main columns against surprise from hostile ground forces and assures time for the main body to prepare for offensive or defensive action.

As the distance between opposing forces decreases, the various security measures merge one into the other in the direction of the enemy threat. When exposed to air, mechanized or motorized formations, the front, flanks, and rear of the main body disappear and security becomes a perimeter obligation.

With such a protective screen of reconnaissance elements combing the air and ground to a depth of 200 to 300 miles, it is difficult to visualize sudden collisions, meeting engagements of large bodies of troops modernly equipped. Modern reconnaissance acts as a bumper and practically precludes such occurrences. There will be first a series of preliminary meeting engagements between advance detachments.

Thus we see that security is essential to every commander if he does not want to risk being surprised in the very act of march, halt, or maneuver, and that he must provide for a far-flung security in order to allow himself the *time* and *space* necessary to insure his scheme of maneuver, allow changes in his dispositions, and make an allotment of his means to carry out his intentions.

Summary

Strategical surprise results when a commander, who, because of being inadequately informed of the movements of the enemy, finds himself unexpectedly confronted with a situation which he can not meet in time. *Tactical surprise* comes to a commander who, because of his lack of information, runs onto an enemy in position ready to meet him with fire while his command is still in march formations. Actual, *physical surprise* comes to the troops who either marching or at a halt, suddenly find themselves exposed to the short-range fires of automatic weapons or attack from the air. All of these types of surprise result from a lack of appreciation on the part of commanders concerned with the essential principles of security—or at least a lack of application of those essentials which they should know.

If we want a command to carry out the maneuver or mission which the commander has decided upon, under the most favorable circumstances, we must have two kinds of security:

1. Security for the commander, or strategical and tactical security. This comprises the entire field of troop dispositions which will protect his scheme of maneuver, allow him to make a decision, plan an operation, and then to change it in accordance with the successive moves of the enemy and in spite of every effort of that enemy to prevent its execution.

2. The security of the troops, or actual, physical security. These are the dispositions which are made to allow each unit to carry out its mission without exposing itself at any time to the deliberate fire of an enemy, from ground or air, without first being placed in a position to return it.

These two forms of security complement each other, since the security of the troops is naturally one of the primary factors in giving security to the commander. To create this atmosphere of mental and physical tranquillity which will enable the commander to make his decisions without haste and which will spare the troops, who are usually young and inexperienced, the nervous strain of being constantly on the alert for the unexpected, information of the enemy must be obtained at greater distances than ever before; distances must be greater between the various echelons of security detachments and the main body; security detachments must be more numerous and must have different dispositions than heretofore; and the main body must march in a more flexible formation and as combat teams, in order to be able to maneuver; all elements should, as far as possible, keep concealed. Secrecy of movement becomes paramount, while marching or halted in a zone of security.

CONTROL OF ANTI-AIRCRAFT MEASURES

[2 October 1936]

The following doctrine relative to the control of means and methods employed by forces in the field for defense against air attack will govern in the instruction at The Command and General Staff School:

The commander of any force is responsible for the coordinated employment of all means and methods adopted by the elements of his command for defense against air attack. He insures this coordination directly or through a designated anti-aircraft officer.

Instructions for the anti-aircraft artillery and for units assigned exclusively to anti-aircraft defense will be placed in a lettered subparagraph of paragraph 3 of the commander's order. Special instructions pertaining to anti-aircraft defense for units other than those assigned exclusively to anti-aircraft defense will be placed in a numbered subparagraph of subparagraph 3 x of the commander's order. When necessary an Anti-aircraft Annex to the commander's order will be issued, in which case the usual reference to the annex will be made in the above subparagraphs of the field order.

The text, *Combat Orders*, C. & G.S.S., 1936, does not now conform to this doctrine and the necessary changes will be made in the near future. Pending such changes all concerned will take cognizance of the new doctrine in the preparation of instructional matter, and in the solution of problems, and exercises.

ESTIMATE OF THE SITUATION

Exercise—1

[10 September 1936]

	Paragraphs
SECTION I.—Situation and First Requirement	1-3
II.—A Solution of First Requirement and Second Requirement	4-5
III.—A Solution of Second Requirement	6
IV.—Discussion	7-13

SECTION I

Situation and First Requirement

	Paragraph
General situation	1
Special situation (Blue)	2
First requirement	3

1. GENERAL SITUATION.—*a. Maps.*—General Map, Gettysburg, 1925, 1 inch = 5 miles. Special Map No. 6 Army Extension Courses (1936) 1:21,120. Overlay No. 1 herewith.

b. Boundaries.—The 362d north and south grid line north of the Potomac River is the boundary between two hostile states, Blue (east) and Red (west).

c. Additional concentrations.—(1) Both belligerents are planning to concentrate additional troops: Blue, north of Baltimore (410-685); Red, in the Cumberland Valley north of Hagerstown (303-727) (both General Map).

(2) A Red regiment of infantry with some light artillery, stationed in Gettysburg (350-750), has been furnishing border patrols generally east thereof. A Red reinforced brigade, less one regiment, is known to be mobilizing at Chambersburg (310-764) (General Map). Information from Blue GHQ indicates that the mobilization of this brigade will not be completed before dark, 10 September.

d. Organization.—The organization of Blue and Red forces is similar, and reports indicate that the combined Red force at Chambersburg and Gettysburg has the normal amount of transportation and other supply and administrative troops corresponding to that of a Blue reinforced brigade.

2. SPECIAL SITUATION (BLUE).—*a. 1st Brigade, reinforced.* (See Note 1.)—The 1st Brigade, reinforced, a

component of the 1st Division, was moved by rail from Baltimore (General Map) to the vicinity of Hanover (373-746), where it completed its detrainment 10 September.

b. Mission of the 1st Brigade, reinforced.—The mission of the 1st Brigade, reinforced, is to seize and hold Gettysburg.

c. Action prior to 11:00 AM, 10 September.—The 1st Squadron 1st Cavalry, reinforced, relieved weak border guards along South Branch Conewago Creek and moved west late 9 September to seize the ridge in the vicinity of Bonneauville (359-748). Contact with the Reds was soon established west of South Branch Conewago Creek, and the westward advance of the squadron was halted. During the morning, 10 September, the 1st Battalion 2d Infantry, with the 1st Platoon Howitzer Company and the 1st Battalion 1st Field Artillery, attached, were moved west of South Branch Conewago Creek to cover the brigade and to develop the hostile situation. By 11:00 AM, 10 September, the Red covering forces had been driven west and the Blue advance was stopped along the general line: western edge of the woods in the vicinity of road junction 538-L (362-747)—western edge of the woods one hundred yards east of W. E. Palmer (361-745).

d. Situation at 11:00 AM, 10 September.—At 11:00 AM, 10 September, Brigadier General "1st Brigade" is at his command post in Hanover. The situation at that time, as known to himself, the brigade staff, and the regimental commanders, is as follows:

(1) *Enemy.*—(a) The Red force on the front of the 1st Brigade is estimated to consist of one infantry regiment, reinforced by antiaircraft artillery and several batteries of light artillery. It appears to be occupying an intrenched position east of Bonneauville in area shown on Overlay No. 1.

(b) Red observation aviation reconnoitered the area in the vicinity of Hanover during the afternoon, 9 September and the morning, 10 September.

(c) Reports from higher headquarters and from the reconnaissance agencies of the 1st Brigade indicate that at 11:00 AM, 10 September, the only Red troops north of the Potomac River are those on the front of the 1st Brigade, and the force at Chambersburg which has not started to move.

(2) *Own forces.*—(a) At 11:00 AM, 10 September, the 1st Battalion 2d Infantry, with the 1st Platoon Howitzer Company and the 1st Battalion 1st Field Artillery, is covering the 1st Brigade and holding the line shown on Overlay No. 1. The 1st Squadron 1st Cavalry, reinforced (less Troop A), from the woods in the vicinity of road junction 596-A (362-751), is reconnoitering the Red north flank. Its patrols have reached the line: Cedar Ridge (361-751)—Guldens (359-753)—Hunterstown (356-756). Troop A 1st Cavalry, from the vicinity of Two Taverns (356-743) is reconnoitering the Red south flank. Its patrols have reached the line: stream at CR 529-A (356-745)—bridge at (353-745)—J. Bushman (352-746)—Rock Creek to Barlow (350-740). Patrols have received small-arms fire from Granite Hill (356-752), and from the knoll north of J. Bushman. There apparently is a defended road block over Rock Creek bridge at (351-746).

(b) The 1st Brigade has completed detrainment. At 11:00 AM, 10 September, the units (less detachments) are bivouacked in the areas shown on Overlay No. 1, ready for further missions.

(c) The 901st Observation Squadron, operating from an airdrome at Stewartstown (411-740) (General Map), is reconnoitering to the general line: Carlisle—Chambersburg—Hagerstown (all General Map), inclusive. A landing field has been established at Hanover.

(d) Brigadier General "1st Brigade", has just received a message from Major General A, commanding the 1st Division, which states that the leading elements of the remainder of the 1st Division will arrive by rail at Hanover from Baltimore (General Map) at dark 14 September, and that the division will complete detrainment by noon, 15 September.

(e) The 1st Brigade, reinforced, is a well-trained, first-class combat organization. The physical condition and morale of the troops are excellent.

(f) All units are completely supplied and equipped, unit reserve supplies are intact, and adequate arrangements have been made for the supply and evacuation of the 1st Brigade.

e. Miscellaneous.—The weather is clear and cool; forecast for 11 September, no change. Roads are dry and firm.

The Monocacy River, south of Harney (352-736) (General Map), is unfordable. All other streams shown on Special Map are fordable by all arms.

3. **FIRST REQUIREMENT.**—So much of the estimate of the situation as of 11:00 AM, 10 September, as would be contained in paragraphs 1 and 2 of THE COMMANDER'S ESTIMATE OF THE SITUATION (see page 156, *Combat Orders*).

NOTES

1. For the composition of an infantry brigade, reinforced, see *Reference Data* 1936, The Command and General Staff School.

2. Solutions will be turned in by 3:30 PM.

SECTION II

A Solution of First Requirement and Second Requirement

	Paragraph
A solution of first requirement -----	4
Second requirement -----	5

4. A SOLUTION OF FIRST REQUIREMENT.—

1. **MISSION.**—*a.* My mission is to seize and hold Gettysburg.

b. As a hostile force is between me and my objective, my immediate mission is to defeat this force or march around it.

2. **THE SITUATION AND OPPOSING LINES OF ACTION.**—*a.* *Considerations affecting the opposing lines of action.*

(1) *Relative combat strength.*—The hostile force in my front is estimated as an infantry regiment reinforced by several batteries of light artillery.

My force consists of a reinforced brigade. It contains medium artillery, tanks and cavalry, none of which have been observed with the hostile force.

Other factors affecting the combat strength are relatively common to the two forces. Consequently I am at present superior to the enemy in a ratio of more than two to one.

Deduction.—My present superiority favors offensive action.

(2) *Reinforcements.*—The Red brigade, reinforced (less the force on my front), which has been reported mobilizing at Chambersburg can not start to move before dark tonight. Chambersburg is about thirty miles west of Bonneauville. If the Chambersburg Reds started a forced march at dark tonight, and were not delayed or interfered with, they could reach the vicinity of Bonneauville tomorrow afternoon. As the force has the normal amount of transportation pertaining to a reinforced brigade, small increments of the Chambersburg force in trucks and its cavalry squadron, if not interfered with, could reach the Bonneauville area during the afternoon and night. However, if I keep the force under observation, which I will do, and take adequate measures to delay the force if it starts moving east, I should be able to prevent it from effectively supporting the Red force in my immediate front until late tomorrow.

The leading elements of the remainder of my own division will begin arriving at Hanover at dark the 14th. I can therefore expect no assistance for the next four and one-half days.

Consequently, while at present I am greatly superior to the force on my front, by tomorrow night the two opposing forces may be approximately equal depending upon the circumstances of the next twenty-four hours. Should it become necessary for me to detach the greater portion of my cavalry, reinforced by some infantry in trucks, to delay the Chambersburg Reds, I still would have a decided superiority of force all day tomorrow.

Deduction: The possibility of early Red reinforcements demands prompt offensive action on my part, and favors a delaying or defensive action on Red's part.

(3) *Dispositions.*—The Red force has been in the Gettysburg area for some time and has organized a position with a completed system of intrenchments for defense of their front and flanks. They can make a strong defense against a frontal attack or a close in envelopment. Their dispositions do not prevent delaying action, withdrawal or attack. My force is well in hand and suitably disposed for operations of any type against the Reds.

Deduction.—Red dispositions render a frontal attack or a close in envelopment by my force inadvisable.

(4) *Time and space.*—Eight hours and thirty-five minutes of daylight remain. It will take me approximately eight hours to march and launch an attack from a suitable location for a wide envelopment of the Red north flank and approximately nine hours on the south flank. There are nine hours and fifteen minutes of darkness the night, 10-11 September.

Deduction.—A wide envelopment is impracticable today. There is sufficient time during the night, 10-11 September, to make a night march and a wide envelopment of either flank early tomorrow. The Reds have time during darkness to withdraw to a delaying position or to the Wolf Hill ridge.

(5) *Terrain.*—The Red position is not particularly strong. It has good fields of fire, rather good observation from the vicinity of St. Luke's Church, and a good road net. It is weak in that it has no natural obstacles, its flanks are insecure, and the position is exposed to my own observation. The ridge and stream lines are generally parallel to the front and run generally north and south from the position, thus making the position strong against a frontal attack, while offering rather good avenues of approach into its vital areas from the vicinity of Moritz School (360-754) on the north flank, or from the vicinity of Two Taverns (356-743) or St. Mary's Rf Church (353-745) on the south flank. The observation, fields of fire, cover, obstacles, and communications do not particularly favor the attacker on one flank more so than on the other.

The parallel ridges generally west of the position would favor a delaying action on the part of Red. The Wolf Hill ridge—Gettysburg area would not only be a strong defensive position, but an attack against it from the south flank may take so long that, in the face of the possibility of early Red reinforcements, such a delay might seriously jeopardize the accomplishment of my mission. This area favors the defense against an attack on the south flank. Rock Creek, while fordable, may be quite an obstacle at places.

Deduction: For Red, the terrain favors a delaying action and a strong defense in the Wolf Hill ridge—Gettysburg area. For Blue, the terrain favors an envelopment of either flank of the Bonneauville position. If Red withdraws to

Wolf Hill ridge the terrain favors an envelopment of the north flank. Daylight movements cannot be concealed from ground observation.

(6) *Knowledge of our strength and dispositions.* (Secrecy).—As Red observation aviation has reconnoitered the area in the vicinity of Hanover during the day, Red is undoubtedly aware of our detrainment, strength, and dispositions. His ground observation on Granite Hill and St. Luke's Church makes it almost impossible to conceal daylight movements from him.

Deduction.—It will be difficult, if not impossible, to obtain deception, secrecy, or surprise except by a night movement.

b. Enemy capabilities.

- (1) To attack.
- (2) To defend present position.
- (3) To retire during the night of 10-11 September, to a defensive position in the vicinity of Wolf Hill ridge.
- (4) To delay in successive positions.

c. Own lines of action.

- (1) To march around the enemy.
- (2) To envelop the hostile north flank early tomorrow.
- (3) To envelop the hostile south flank early tomorrow.

5. SECOND REQUIREMENT.—Paragraphs 3, 4, and 5 of THE COMMANDER'S ESTIMATE OF THE SITUATION.

NOTES

1. In solving the requirement, students will limit themselves to a consideration of the following *enemy capabilities* and *own lines of action*.

a. Enemy capabilities

- (1) To attack.
- (2) To defend present position.
- (3) To retire, during the night, 10-11 September, to a defensive position in the vicinity of Wolf Hill ridge.
- (4) To delay in successive positions.

b. Own lines of action

- (1) To march around the enemy.
- (2) To envelop the hostile north flank early tomorrow.

- (3) To envelop the hostile south flank early tomorrow.
2. Solutions will be turned in by 5:00 PM.

SECTION III

A Solution of Second Requirement

A solution of second requirement Paragraph 6

6. A SOLUTION OF SECOND REQUIREMENT.—

3. ANALYSIS OF THE OPPOSING LINES OF ACTION.—*a.* *Red 1st capability (to attack).* Red can attack (1) my covering force at any time today, (2) my holding force at night if I decide to make an envelopment, or (3) my enveloping force if I decide to make an envelopment or to march around. In the first case he gives up the advantage of a prepared position and the bulk of my troops will be able to initiate a counteroffensive with every probability of success. In the second case my holding force will be strong enough to meet the attack, Red will be unable to withdraw before my enveloping force is behind him and the success of my envelopment would be assured. In the third case such an attack at night would be extremely difficult and could not be successful unless I failed to take the necessary reconnaissance and security measures. Red would give up his prepared position and my larger force should be able to defeat him decisively. Any of these attacks would play into my hands, regardless of the line of action I adopt, unless I fail to take proper reconnaissance and security measures.

b. (1) My first line of action. (To march around.)— If Red defends his present position and I march around I can seize Gettysburg. But this will leave a force in my rear to interfere with my communications and Red could destroy our facilities at Hanover. Red then could effect a junction with the Chambersburg Reds and I would lose the opportunity of decisively defeating an inferior force before it can receive reinforcements. Red could withdraw, after he discovered my march around, to effect a junction with the

Chambersburg Reds. In this event my mission would be accomplished but I cannot be sure of any such action on his part.

(2) Should the enemy retire tonight on Gettysburg or delay in successive positions (3d and 4th capabilities) while I attempt to march around him, I should be in a favorable position to launch a surprise attack against him early tomorrow morning before he is ready to receive it.

c. My second line of action. (To envelop the hostile north flank.)—(1) If the enemy defends his present position, a wide envelopment from the vicinity of Moritz School should avoid the prepared position, strike the enemy in a vital quarter where he is unprepared to receive an attack, and threaten his lines of retreat. Such a maneuver would cause the enemy to overextend his lines or to execute a difficult withdrawal, thus allowing me to exploit my combat superiority to the maximum.

(2) If the enemy retires toward Gettysburg or attempts delaying action (3d and 4th capabilities), my force would be favorably disposed to execute an attack against his new position without loss of time.

d. My third line of action. (To envelop the hostile south flank.)—(1) If the enemy defends his present position, an envelopment of the south flank should have practically the same results as an envelopment of the north flank.

(2) If the enemy retires to defend the Wolf Hill ridge—Gettysburg area, or delays in successive positions with the Wolf Hill ridge—Gettysburg area as a final position (3d and 4th capabilities), my force would be favorably disposed to execute an attack against the hostile south flank without undue loss of time. I would however have the disadvantage of having to attack the dominating Wolf, Culp's, and Cemetery Hills. I cannot be sure that this attack would be successful before Red is reinforced.

4. COMPARISON OF OWN LINES OF ACTION.—*a.* A march around (my first line of action) exposes my lines of communication, allows interference with the arrival of the remainder of the division and permits a junction of the two Red forces.

b. The decisive element in determining which flank to envelop (my second or third lines of actions) is that, if Red withdraws or delays and defends the Wolf Hill ridge posi-

tion, I have a much better chance of a successful and quickly completed attack on the north flank. The south flank offers no compensating advantages.

c. I conclude that my second line of action (wide envelopment of the north flank) is most advantageous.

5. DECISION.—To attack early tomorrow morning enveloping the hostile north flank from the vicinity of Moritz School.

SECTION IV

Discussion

	Paragraph
Purpose -----	7
Mission -----	8
The situation and opposing lines of action -----	9
Analysis of the opposing lines of action -----	10
Comparison of own lines of action -----	11
The basic decision -----	12
General remarks -----	13

7. PURPOSE.—The purpose of this exercise is to illustrate the use of the outline for a COMMANDER'S ESTIMATE OF THE SITUATION in analyzing a simple tactical situation and arriving at a proper decision.

8. THE MISSION.—The mission is the specific task given the commander. It underlies all his actions and must be clearly in mind when arriving at a decision. In this situation the direct accomplishment of the mission is hindered by the presence of a hostile force between the commander and his objective. This requires a mental analysis by the commander to determine his immediate (or contingent) mission and a clear statement by him of what his immediate mission is.

9. THE SITUATION AND OPPOSING LINES OF ACTION.—a. The various factors or elements of the situation limit the lines of action open to you to accomplish your mission and the physical capabilities of the enemy to hinder its accomplishment. In the second paragraph of the estimate these fixed or constant factors of the situation, such as: relative combat strength, terrain, dispositions, time and space, etc., are considered to determine the physical limitations they impose on your own and the enemy's ability to act. Deductions

are drawn as to the effect of each of the factors favoring, limiting or preventing the use of any of the tactical methods by which your mission can be accomplished by you or prevented by the enemy. When all of the applicable factors have been considered in connection with all possible tactical methods of acting, both on your part and that of the enemy, you can determine and state all *reasonable and practicable* lines of action which can accomplish your mission and all the physical capabilities of the enemy to hinder or prevent its accomplishment.

b. Relative combat strength, considered in connection with your mission, will influence your decision whether you take offensive or defensive action. For this reason you ordinarily will consider this factor first. Having determined that your relative combat strength is great enough to warrant the offensive action that your mission requires you can proceed to the other fixed factors in the situation considering them in connection with possible offensive tactical methods, such as frontal attack, close in envelopment, wide envelopment, march around, etc. You have no knowledge of the enemy's intentions so, in examining these factors with reference to his capabilities, you have to keep in mind the effect of these factors on any tactical method, offensive or defensive, he might use.

c. The possibility of hostile reinforcements exists. This should be probed and the time and space factors computed. The possibility of the enemy's strength being doubled will vitally influence your decision. You have no information that the Chambersburg Reds *will* start to move at dark, 10th of September, but you have been informed that they are capable of moving at that time. So as not to be surprised by their arrival you should determine the earliest possible time under forced march conditions the main body can arrive and how soon motorized detachments can be expected.

d. The hostile location and intrenchments, considered under the subheading of *dispositions*, have so important an effect in limiting your lines of action that your deduction should indicate that they make a frontal attack or a close in envelopment inadvisable. You are well aware of the futility of frontal attacks against an organized position unless supported by an overwhelming mass of artillery fire and tanks.

Consideration of the hostile dispositions at this point in your estimate should have led you to discard further consideration of a frontal attack or a close in envelopment unless other considerations such as: extreme urgency as to time, great over extension of the hostile front, or secure hostile flanks made other tactical offensive methods impracticable.

e. Simple time and space computations prove the impracticability of making an envelopment today wide enough to avoid the hostile organized position or extensions of it to either flank.

f. How much terrain should you study? In this situation you have to reach Gettysburg so you must study the intervening terrain. The important conclusions you should reach from this study are that the parallel ridges favor Red delaying action, that Wolf Hill ridge is a strong defensive position on which Red could retire, that there is little choice between flanks for a wide envelopment of the Bonneauville position, and that the north flank is much more favorable to you if Red forces you to attack him on the Wolf Hill ridge position.

g. The factor of enemy knowledge of your strength and dispositions should be discussed since it has an important bearing on your decision to act today or tonight. Other factors should be considered mentally, but having little influence on your decision, need not be given a written study.

h. Having considered all the fixed factors in the situation confronting you and having deduced and stated their most decisive effects, you state in general terms all reasonable and practicable lines of action open to you which will accomplish your mission and all physical capabilities of the enemy to act adversely. Your force and the enemy force are the variables in the situation, but your study of the fixed physical factors of the situation have determined the limits, affecting your mission, within which the two variables can act. These limits are expressed as your own *reasonable and practicable* lines of action and as enemy *capabilities*. You are then ready to place these different lines of action and capabilities in opposition to determine what could happen in the future to each of your lines of action if it were adopted.

10. ANALYSIS OF THE OPPOSING LINES OF ACTION.—In this situation the Red 1st capability (to attack) will apparently play into your hands. Nevertheless, it should be briefly analyzed, its effects considered and a conclusion reached concerning it. Each of your own lines of action is then opposed to each of the remaining Red capabilities to determine what will happen to each if it were adopted. You have to visualize what would happen in each eventuality. Each line of action should be mentally tested to determine if all elements of your command would be secure, if you can maintain control, if it forces the enemy to conform to your will, how will you be situated for future action in the event of success, in the event of failure, how decisively will the enemy be affected, what will its cost be in losses, time and disorganization. For each eventuality you should visualize the reaction of the enemy, foresee the incidental decisions and plans necessary to meet the hostile reaction, and make certain that the requirements of the line of action can be met. Only the considerations that have an important bearing on your choice of a line of action need be written, but you cannot discover these without a methodical mental visualization. When this has been done you have completely examined and assessed all the advantages and disadvantages of each of your lines of action, your most important conclusions have been written for emphasis, you are ready to compare the advantages and disadvantages of your lines of action and make a decision.

11. COMPARISON OF OWN LINES OF ACTION.—The comparison is made by stating with reference to each course of action its decisive advantages and disadvantages. These are carefully weighed and balanced, one against the other. If the previous consideration of the factors of the situation and the analysis of the opposing lines of action has been thorough, if important effects have been justly assessed, the determination of a sound decision should be relatively simple.

12. THE BASIC DECISION.—The commanders basic decision is brief and shows in concise and definite terms the line of action which the command *as a whole* is to adopt to meet the *immediate* situation. It is the basis for the development of the plan of action. In this situation there is sufficient information to include in the decision *what* (attack) the command as a whole will do, and *how* (wide envelopment), *when*

(early tomorrow morning) and *where* (St. Moritz School) it will be carried out.

13. GENERAL REMARKS.—In this situation Brigadier General A would not have had time to write a complete Commanders Estimate of the Situation such as the foregoing. However, the mental process involved is brief, and he would have had to examine and assess mentally all the elements of the situation to arrive at a sound decision. An estimate of the situation by a commander in the field should form the basis for every decision of importance. In order to make such an estimate, the commander will strive to obtain as complete information as possible of the dispositions and combat strength of the enemy forces; he will keep himself informed of enemy capabilities; and he will desire complete information of the terrain. Since all of these factors are seldom positively known, the commander usually can make only an estimate which is subject to continual revision. The enemy's strength and dispositions are usually not fully known until he has become engaged. The advantage and disadvantage of the terrain are discovered gradually by reconnaissance and actual combat. It is thus apparent that an estimate made by the commander in the field will be a running estimate—one which is gradually built up as information filters in. Unless a commander has been trained to think logically, to give each item its proper value, and no more than its proper value, he will likely become confused, and allow himself to be engulfed in the mass of details with which his subordinates have become occupied. Close adherence to a logical process of reasoning, in which only the factors bearing on the problem are given their proper places is essential. The estimate of the situation provides such a process of reasoning.

Section 6

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List of Periodicals Indexed and Key to Abbreviations

AN&AF Gaz —Army, Navy & Air Force Gazette (Great Britain)	Mil Eng —Military Engineer
A Ord —Army Ordnance	Mil Surg —Military Surgeon
A Quar —Army Quarterly (Great Britain)	Nav Inst Proc —Naval Institute Proceedings
Bul Belge Mil —Bulletin Belge des Sciences Militaires (Belgium)	Pion —Pioniere (Germany)
Can Def Quar —Canadian Defence Quarterly (Canada)	QM Rev —Quartermaster Review
Cav Jour —Cavalry Journal	Res Off —Reserve Officer
Cav Jour (GB) —Cavalry Journal (Great Britain)	Rv l'Air —Revue de l'Armée de l'Air (France)
CA Jour —Coast Artillery Journal	Rv d'Art —Revue d'Artillerie (France)
FA Jour —Field Artillery Journal	Rv de Cav —Revue de Cavalerie (France)
Ftg Forc —Fighting Forces (Great Britain)	Rv d'Inf —Revue d'Infanterie (France)
Inf Jour —Infantry Journal	Rv Gen Mil —Revue du Génie Militaire (France)
Jour RAMC —Journal of the Royal Army Medical Corps (Great Britain)	Rv Mil Fran —Revue Militaire Française (France)
Jour R Art —Journal Royal Artillery (Great Britain)	Rv Mil Suisse —Revue Militaire Suisse (Switzerland)
Jour RUSI —Journal of the Royal United Service Institution (Great Britain)	Riv Art e Gen —Rivista di Artiglieria e Genio (Italy)
Jour USII —Journal of the United Service Institution of India (Great Britain—India)	RAF Quar —Royal Air Force Quarterly (Great Britain)
MC Gaz —Marine Corps Gazette	Roy Eng Jour —Royal Engineers Journal (Great Britain)
Mil Mitt —Militärwissenschaftliche Mitteilungen (Austria)	Sanct Chris —Sanct Christophorus (Germany)
Mil-Woeh —Militär-Wochenblatt (Germany)	SC Bul —Signal Corps Bulletin
	Vet Bul —Veterinary Bulletin
	Ws & W —Wissen und Wehr (Germany)

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The development of the aircraft catapult. (Jour RUSI—Aug 1936)

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The first engagement of French tanks, 16 April 1917. (Rv d'Inf—Apr 1936)
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H—Military Conduct of the War in the Field

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Portrait of a corps commander. (Ftg Forc—Oct 1936)
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The withdrawal of the German 113th Infantry

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The day before Cantigny. (Inf Jour—Sep-Oct 1936)
Machine gun battalions. A war experience. (Mil-Woch—18 Jun 1936)
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Communications. (Rv Mil Suisse—May 1936)
The withdrawal of the German 113th Infantry Division behind the Marne on 19-20 July 1918. (Ws & Wr—Apr 1936)

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A breach of neutrality. (Nav Inst Proc—Sep 1936)
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On the Duke of Wellington. (Nav Inst Proc—Sep 1936)

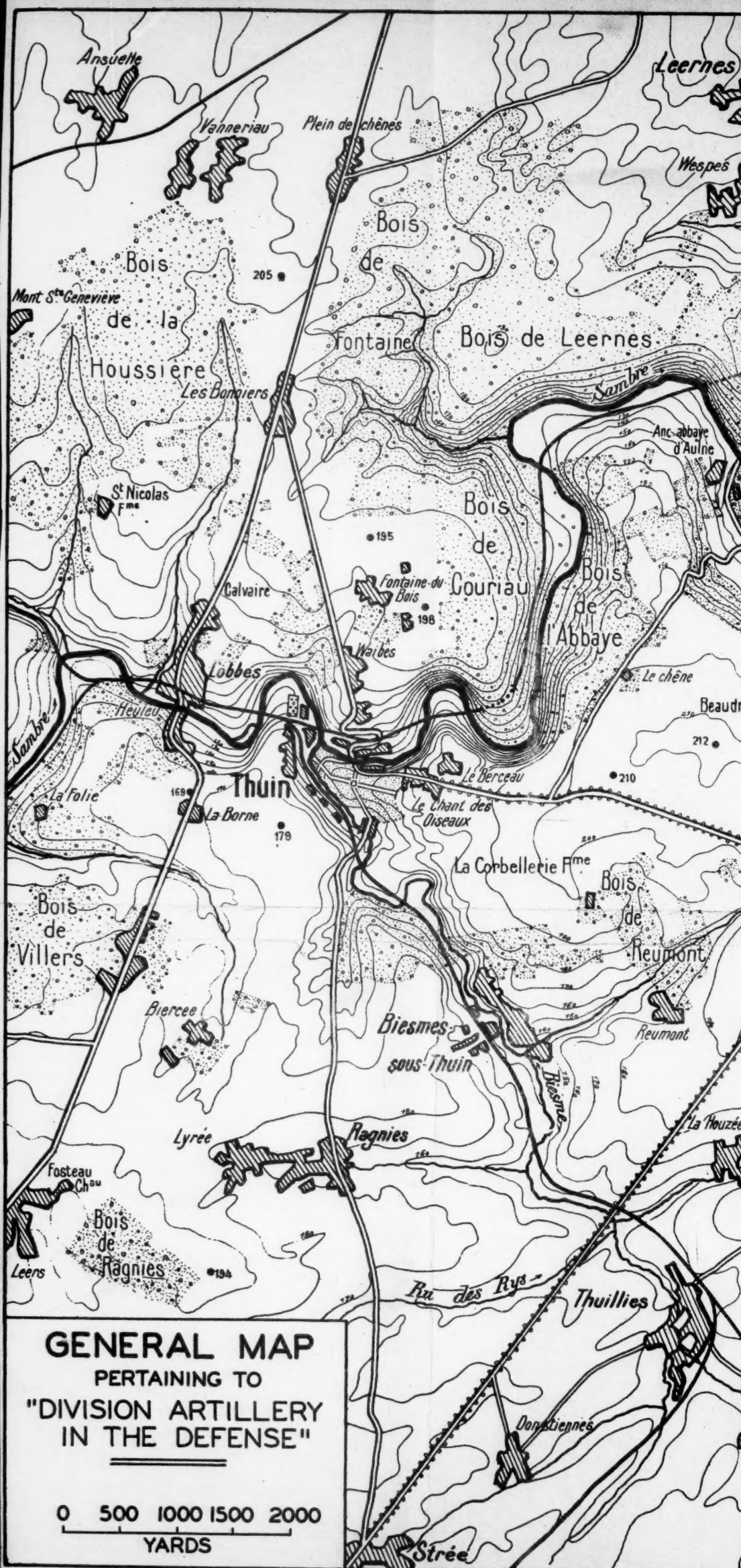
WITHDRAWAL

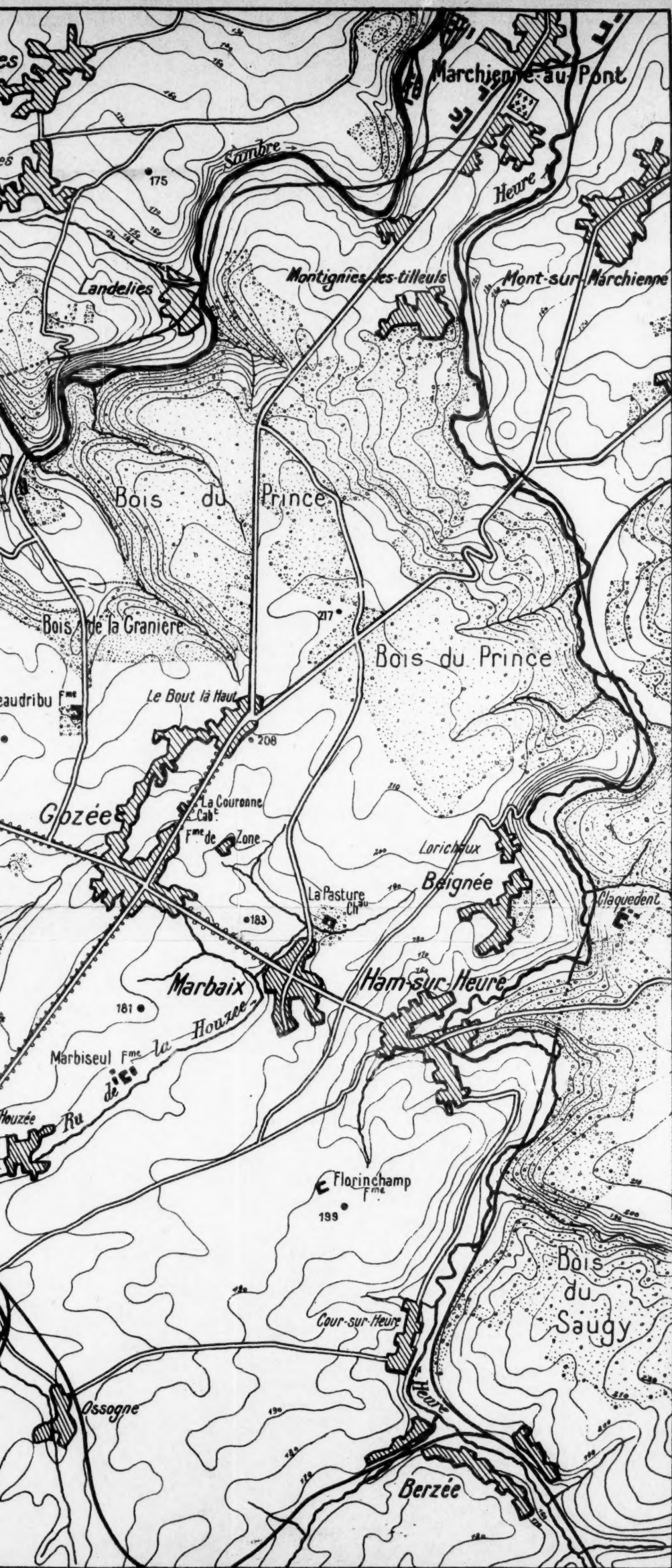
Covering forces during the withdrawal. (Mil-Woch—11 Aug 1936)
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Y

YUGOSLAVIA (ARMY OF)

Yugoslavia's new army. (AN&AF Gaz—1 Oct 1936)
Motorization of the world. (Sanct Chris—May 1936)





SKETCH 15



Sketch 16

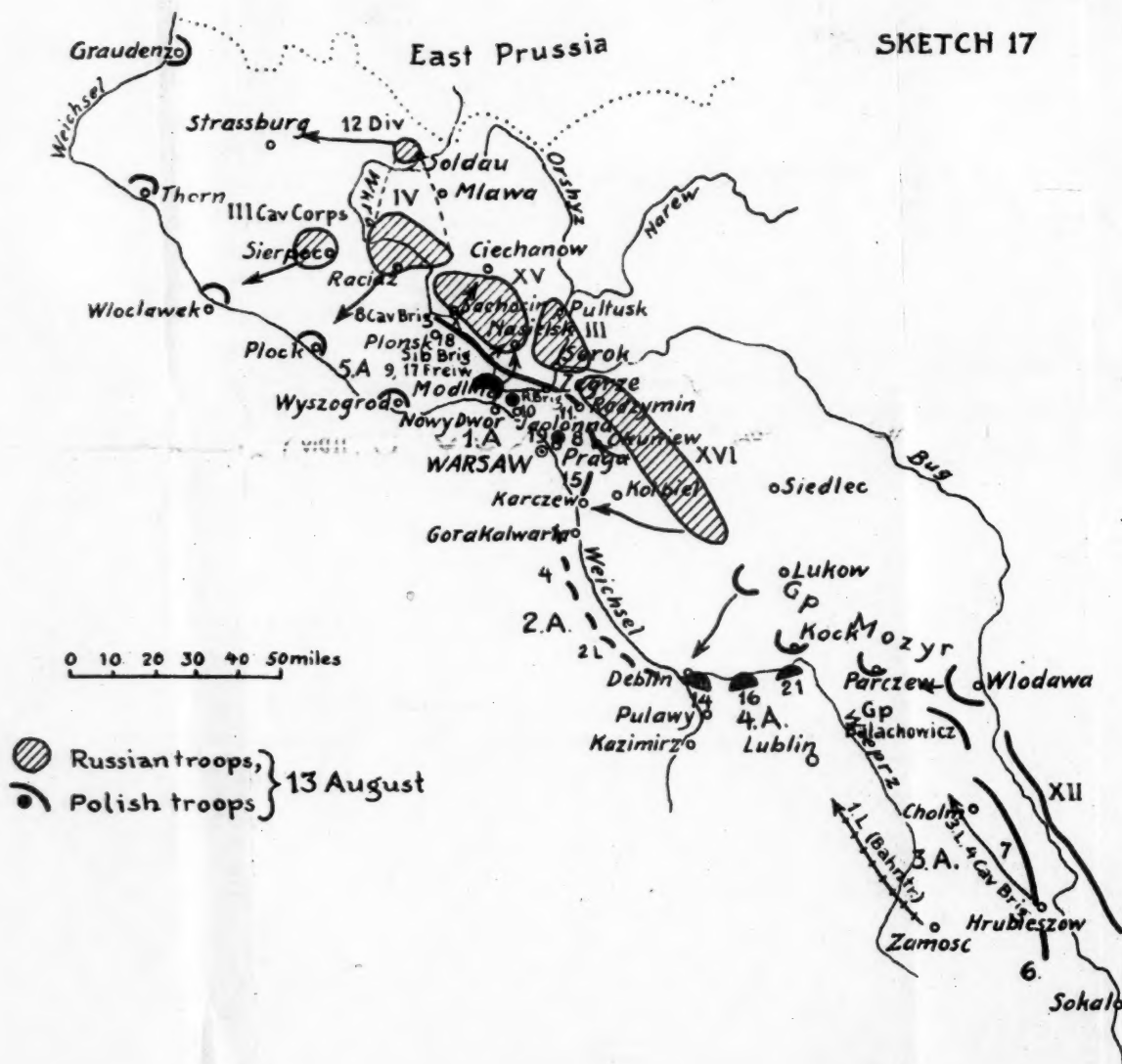
Strength as of 16 August 1920 according to

Russian		Polish
Fourth Army	28,000	Group Wloclaw
Fifteenth Army	26,000	Fifth Army
Third Army	20,000	First Army
Sixteenth Army	20,700	Second Army
Group Mozyr	8,000	Fourth Army
Twelfth Army	22,500	Third Army
Budennij's Cav.	30,000	Sixth Army
Fourteenth Army	18,000	Ukrainian Arm
Total	173,200	Total

Strength in the Vistula sector as of 16 August according to Sikorski

Russian	Rifles	Salvos	Guns	Polish
III Cav. Corps				Fifth Army
Fourth, Fifteenth & Third Armies.	61,275	667	382	First Army
Sixteenth Army	26,901	662	110	Fourth Army
Group Mozyr	5,020	164	27	Third Army
Twelfth Army	11,000	600	110	
Total	104,196	8,093	629	Total

SKETCH 17



g to Pilsudski

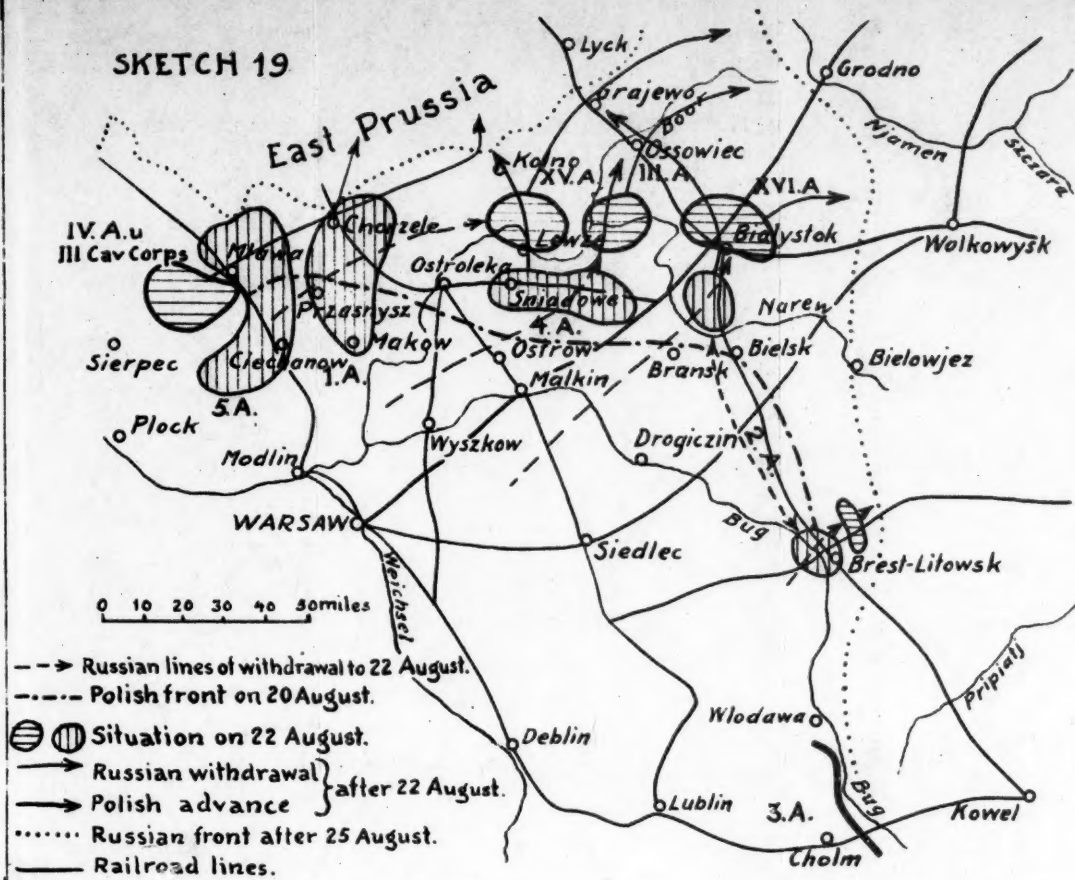
Polish

Wloclawek	12,000
my	34,000
my	38,000
Army	12,000
Army	23,500
my	25,000
my	22,000
Army	24,000
	190,500

16 August

	Rifles	Salvos	Guns
	22,010	3,826	141
	36,005	1,172	153
	25,700	950	78
	30,600	5,511	172
	114,315	11,459	564

SKETCH 19



SKETCH 18

